

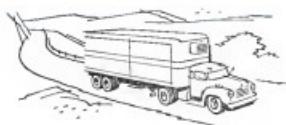
# AVIATION WEEK

A McGRAW-HILL PUBLICATION

SEPT. 13, 1954

50 CENTS

## TEN TIMES STRONGER THAN TRUCK WHEELS OF SAME WEIGHT!



ONCE an airplane touches the ground it is out of its element. That is where its wheels take over a task which is truly Herculean, when one considers the forces encountered.

Airplane wheels must withstand pressures of 1,000 pounds per square inch—and more—in order to qualify for this exacting service.

Compounding the problem is the fact that the rotating disc of the brake mechanism is geared to the wheel structure. So the wheel must transmit the torque generated by the retarding action of the brake.

Moreover, the wheel must be able to withstand the tremendous demands of tire pressure, shock loading, static loading, side loading and torque loading—often in simultaneous combination.

All this must be engineered into the airplane wheel—a structure which must, above all, be exceedingly light for its size and capacity!

In the past ten years, Goodyear research has advanced the design of airplane wheels from 190 pounds average load capacity per pound of wheel to 250 pound capacity. It has pioneered the "wave-type" design which is easier to cast and machine—has utilized strain gauge, stress coat, load machines, burst and flight tests—constantly researching and finding new ways to improve upon one of man's oldest inventions—the wheel—for the betterment of aviation progress.

Goodyear, Aviation Products Division  
Akron 16, Ohio or Los Angeles 54, Calif.



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ZENITH all-weather  
radomes help keep the  
C-119 flying



Because the Zenith-produced  
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Fieschel's famous "Flying Boxes,"  
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the C-119 can accomplish its all-purpose transport mission  
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GARDENA, CALIF.  
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Fafnir Y-PW Series  
Bearings for  
Curtiss P-40 Combat

Knowing how to get around tough  
aircraft bearing design problems has  
been a specialty of Fafnir Bearing  
Engineers for more than a quarter  
century. Direct result of this knowl-  
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series uses Metal Bearings. Specifically de-  
signed for aircraft "wacky-knick"  
the Y-PW Series is just one of  
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**FAFNIR**  
AIRCRAFT BEARINGS

*FIRST . . . at the racing point  
in aircraft design*



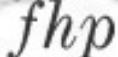




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NEED THESE

# BIG 12\*

"FEATURES-OFF-  
RESISTANCE" IN



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## AIRCRAFT AND MISSILE MOTORS

(AC or DC)

- \* 1 HIGH ALTITUDE
- \* 2 LOW TEMPERATURE
- \* 3 HIGH TEMPERATURE
- \* 4 HUMIDITY
- \* 5 FUELS
- \* 6 SALT SPRAY
- \* 7 VIBRATION
- \* 8 ACCELERATION
- \* 9 FUEL IMMERSION
- \* 10 PLUGGING
- \* 11 OVERHEATING
- \* 12 SHOCK

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our aircraft, laboratory  
and research engineers

In the aviation  
industry and the space industry,  
there are no cold, wet and without  
shock areas. That's why  
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## ELECTRO-AIRE

Electro-Aire Division  
Worrell Company, Inc.  
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4 November 1958, 1958

## The Aviation Week

September 13, 1958

### Headline News

- Airlines Set Trend; Order Boom  
Potential Air Show in Latin America  
Navy's New Fast Cargo Super-Convair  
Now Enters Through-Services Program  
Non-Capital  
Engineering Center Beginning Activities  
New Agt Shows First Flight Test  
Prairie City Employee Contest

### Production Engineering

- Time-Timers Speed Metal Forming  
New Tanker Proves Modular  
Catastrophic Effects of Heat Erosion

### Airlines

- Airlines Take Reliability Down Up

### Equipment

- Fiat Try For-Operating Extremes  
Gulfstream Gains "Circle" For DAL

### Airline Safety

- U.S. Report on Delta D-5 Crash

### Air Transport

- Win TCA Close Victoria Victory  
Air Capital Awarded 10 Years  
Airline Freight Handling Blasted

### The New U. S. Air Force

- Management & Operations III

### Departments

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- What's New  
Cargo, Vessel  
Aeronautics Calendar

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—Courtesy: Sikorsky Aircraft Corp., Stratford, Conn.  
—Courtesy: Trans World Airlines, Inc., St. Louis, Mo.



TARRYTRON



SPEED OF SOUND has been exceeded by Grumman F11F Sea Dart during a shallow dive, marking first time a water-launched plane has accomplished this fact. Dive-wing fighter is powered by two Wright J65s at 6,000 lb. thrust each and has bubble-can landing gear.

## Latest Views of New U. S. Military Planes

**PHOTO TOP:** Version of the North American Sabre (right), designated AJ-2P, can carry seven missiles simultaneously on day or night missions. It can be fitted with various combinations of 15 different types of missiles. A carrier aircraft type, it flies at 600 mph powered by two Ed-Wy'e 2250D Double Wasp jets engine. **MIDDLE:** A Boeing B-57B Canberra bomber in the role of the fighter to provide extra local cover when needed. North American Aviation built the AJ-2P at Columbus, Ohio.



**PHOTO BOTTOM:** Version of the North American Sabre (left), designated AJ-2, shows four engine nacelles along wings on low-suspension wings and its special safety hatch-like door fitted with explosive. The convertible door allows jet loading of a variety of war stores, including rockets. It reaches in a few seconds to 60 mph for takeoff, proceeds despite of high speeds since it prevents large quantities of fuel being lost from entering the plane.



**Boeing selects  
Honeywell Pressure Ratio  
Indicator for the B-52**

This new Honeywell development "seems remote indication of engine pressure ratio, using the proven Vane Inductance principle. Measuring the ratio of stagnation pressure to exhaust pressure with an accuracy of  $\pm .03$  units of ratio, this new indicator replaces the B-52 pilot of exp., accurate rate of power checks, more economical cruise performance.

**Honeywell**  
Aeronautical Division

1000 Highway 66  
Mississippi 12, Miss.



## WHO'S WHERE

### In the Front Office

Walter Stettner, former president of Semco Motors, Inc., passed away September 10, 1964, at age 65.  
Harold E. Mock, former general manager manufacturing director for Hughes Aircraft Co., is now executive vice president of General Motors Corp., Burlingame, Calif., and general manager of its El Segundo Product Division.

Len T. Neal has stepped up to vice president-financial of Sohio Aircraft Co., San Diego. Clinton W. Baileys has been appointed financial controller.

Ronald L. Van Fleet (JSNLL), now on temporary active duty with the Office of Naval Research, has been elected a director of Pioneer Publishing Co., Milwaukee, Calif.  
Albert Green, New York businessman, has joined a advisory committee of Colonial Airlines

### Changes

Walter G. Lewis, former vice president of Champion Forge Co. and specialist in aircraft parts forgings, is general manager of Champion & Forge Co.'s recently acquired Chicago Die Casting Co. General Ernest H. Mordt has been appointed division supervisor.

Paul J. Sauer has been elected assistant secretary of Northrop Aircraft, Inc., Hawthorne, Calif. Michael R. Karpman, Republic Corp., New York City, Robert Zimmerman, chief staff engineer for the program planning and support group of the Weapons Systems Division, Jack Gerber, managing project engineer.

Charles E. Johnson has been appointed production manager of Republic Aviation Corp., Farmingdale, N. Y. Clayton C. Shuler is new chief materials improvement engineer for F-105 project.

John W. Hansen has become chief of flight test of Ryan Aeroplane Co., San Diego.

Werner Coppenrath has been named political relations representative to Northern Cross Airlines' eastern region. Oren C. Atkinson has been appointed chief of operations manager for NELTA, successor R. L. Dilling, who is returning to the U.S. Air Force as a consultant for the German government.

### Honors and Elections

Bronly E. Howard, president of the American Training Society, has been made a Chevalier of Present National Legion of Honor. Maj. Gen. André J. Doss, Secretary Air Commandant operations division, and Lt. Col. John C. Hooser (USAF) are also members of the Legion.

D. C. Wilkes, Jr., obtained selection manager for Convair's San Diego Division, has been honored by the California State Division of Apprenticeship Standards as "apprenticeship master" in recognition of his unique training program.

Sabuy Kiel, quality manager for the Textron Co., has become chairman of the Aviation Safety Committee of Textron Air Service.

## INDUSTRY OBSERVER

• Hamilton Standard will start tests in the next two weeks on a new propeller. New design achieves the savings of all propeller-induced bending moments and the engine shaft transmits torque only. It is designed to operate efficiently at speeds as high as 650 mph.

• Allison T40 engine has been suspended by Navy's Bureau of Ordnance (Aviation Week Aug. 23, p. 11). A fix was made on the piston gas. Allison says a solution has been found to the oil leak difficulties encountered on the T56 (Aviation Week Aug. 30, p. 11).

• Convair FWF-4 Panthers and FWF-7 Cougars have been grounded by the Navy as a safety precaution after fatigue cracks were detected in the fuel tank support of this aircraft (115-15 jet engine).

• Selected member of Personnel Board 12-21 that the Army has at Ft. Sill, Okla., cannot be used for flight training until the Pacific metal blade is replaced by a wood section. Metal blade is blamed for heavy vibrations at some points in the speed range.

• Retraction of the landing gear of the Sikorsky XH-35 turbine-powered helicopter at flight altitude about 15 feet in its closing speed.

• Newest plane at the National Air Show was the first production model of the Fairchild C-123B Avitrus assault transport. It was flown to Durban after only 16 hrs. of test flying the day before taking off for the show.

• Details on what catapult to use on North American's F-100 Super Sabre has changed yet. USAF's Leidos and McDonnell-Honeywell are the principal contractors although NASA's own Downey Aerospace Group also has a proposal.

• "Any departure from the steady level of demand will be sensed," Gen. Thomas D. White, USAF Vice Chief of Staff told industry representatives at the National Air Show. Gen. White also put substantial emphasis on two issues: weapons, entrepreneurial missile and engine-powered aircraft, indicating that there is research and development will result in more scientific progress in the next 10 years than in the last decade.

• One fighter plane in the Bendix Trophy Race was disqualified because wing fairings disengaged at the point flushed across the finish line. Entry landed safely but with surface damage and over efficient pitstop after one stopup in front of crowd.

• A cutaway model of the Rolls-Royce Dart turbojet engine was displayed at the National Air Show with a representative of Capital Airlines explaining features of the engine.

• Power from the ramjet engine in the Republic F-105 used in the F-105 landing with the Convair B-56 adds about 10 to 15 mph. in speed of the F-105 while the jet fighter still is attached to the "mother" plane.

• Metal-grinding of titanium alloy blades successfully protects blades from stress damage. At National Air Show, Hamilton Standard exhibited two blades which had been load tested by thermal cycling, plated, then retested. The unplated blade was penetrated to a depth of 30/1,000 of an inch and the leading edge was cracked while the plated blade was not damaged at all.

• Convair has been awarded a \$1.7-million facilities contract by Air Material Command for its R-10 Hunter program.

• Fairchild's modification program on SH-C-196G, in addition to adding a co-rotational nose wheel (Aviation Week July 26, p. 13), will include an emergency landing system at the landing gear. Programs will take less than two months time. Current and revised models of the C-196G have three feathers.



FAMILY REUNITED by PAA's installment plan is one facet of air credit. TWA flight engineer "pay later" in new position.

## Airlines Predict Boom From Travel Credit

- Entire industry is expected to set up installment plans in near future, following the lead of Pan American.
- Salesmen believe the public is conditioned to 'pay later' buying, needs to be told what air travel has to offer.

By Katherine Johnson

The U. S. scheduled airline industry is headed for mass adoption of "fly now and pay later" plans, pushed by travel experts who predict that nothing short of a boom will result.

An Air Traffic Conference, the airlines' traffic organization, is expected to recommend an existing or a housing plan for the industry as a whole at its meeting starting the last week in November.

But much of this link, a major part of the industry, has moved forward with "pay later" programs since Pan American World Airways started the ball rolling in mid-May. They will give urban airfares a selling point that never has been emphasized so by railroads or shipping lines.

**PAA Results.**—In moving into its first "pay later" scheme, others are following the evolutionary pattern of most other U. S. businesses. From high prices and a restricted market, the industry moved to tap the mass market with low fare credit services.

Now, airline traffic men believe the

quarter, reverting to about \$1 million, will be diverted at "pay later" offices.

The two sales entrepreneurs PAA has featured previously—the creators of social bonds and low cost airfares—will be succeeded. TWA will make arrangements through credit companies to act as "pay later" offices.

**New Trend.**—Doubtless, as in the airline industry's new trend area,

■ **Pan American's "pay later"** plan during the first three months of its operations, mid-May to mid-August, won only a small portion of total sales \$1.5 million out of total passenger ticket sales estimated at \$30 million. PAA officials expect a steady increase in business and a big opening in "pay later" sales next summer when the results of experiments are reflected in vacation rates.

Passes on "pay later" tickets have ranged from \$51 to \$40,000 for a transoceanic who professed not to mind one bit to his son's cash book.

PAA's "pay later" ticket was sold to Edward Roush, an immigrant Census statistician who, during two years in the U. S. used \$300-shoot-the-\$500 to be able to bring his son's family from Germany. PAA's new plan made it possible for him to do this before the son's early return under the terms of his contract.

**TWA Trend.**—TWA reports \$150,000 in sales during the first 20 days of operation of its "pay later" plan. The am-

ount had a \$50,000 backlog of waiting customers when it went into effect Aug. 3.

TWA's plan also has an advantage over the PAA plan: Applications can be processed speedily in few hours, if necessary—since this is done by local airline personnel.

Pan American applications are passed by its financial agent, Beneficial Management Corp., within a maximum of one week, and with provision for one day processing, if necessary. PAN officials say the speed is sufficient since other arrangements for foreign travel—visas, vaccinations, etc.—require greater time.

TWA's prompt approval of "pay later" applications are among 71% to 84%, PAA estimates the rate is 96%.

Other U. S. international domestic airfares appear ready to follow in PAA's and TWA's footsteps. Northwest Orient Airlines is "ready to go forward" and has his a complete "pay later" plan under consideration. British Airways is "studying the situation extensively" and Pan American's own work is well along, according to a spokesman.

PAA stated "pay later" has, pedaled it with vigorous advertising campaigns.



See story and photo inset in

## Fly Abroad now ...pay later!



PAA stated "pay later" has, pedaled it with vigorous advertising campaigns.



PAA stated "pay later" has, pedaled it with vigorous advertising campaigns.

■ "Air transportation long has needed an installment plan to make it accessible to other similarly priced commodities on the consumer market. The large air passenger market will buy airplane tickets on credit, instead of TV sets or automobiles, instead of leaving the TV set and the automobile 'on time' and paying off the vacation until the total price has been saved."

"The plan stems from recognition that Americans respond to a large degree based on credit. Without credit, there would be little hope of maintaining the constant increase in the purchase of durable and consumer goods. More than any other single influence, credit has enabled Americans to achieve and maintain a high standard of living in the world. We want to see our continued trend made a regular part of that standard of living."

"Pay later" is expected to affect air transportation needs in its introduction did for automobile and home appliance industries. In 1951, the last year for which figures are available, households buying automobile for 51% of furniture sales, were 30% of television set sales, and 10% of automobile sales."

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## SBAC Coverage

A complete report on the second Society of British Aircraft Constructors 1954 Flying Display at Farnborough last month will be presented in the next issue of Aviation Week. Robert E. Shaw, executive editor of Aviation Week, posed yesterday Hall, this magazine's London correspondent, to cover the British aircraft show.

Capital is now ready to extend its

## Low-Cost Titanium

Titanium, for aircraft turboprop engines is expected to be available at lower prices than the present \$4.50 to \$4.75 per pound if a new electrolytic process, developed by Canada's Sherritt-Gordon Co., successfully produces the strategic metal.

A pilot plant located at Sherritt-Gordon's Falls, Quebec, is scheduled to begin test next month.



**E-475 FLYING HORSTERS** from England to home bases, passed as formation flyover.



**AIR SHOW SPECTATORS**, in part of the U.S. airpower display's "Report to the Nation."

## National Air Show to Leave Dayton

**Defense Department wants airpower display to move around U.S.; some authorities want it discontinued.**

By Claude Wren

**DAYTON**—The National Airshow will not be held in Dayton next year. General Manager Benjamin T. Erdmann says the Department of Defense will pack another set, and Ft. Worth, Tex., appears to be the leading contender.

Reasons for moving the show, it is understood:

- Defense Department insistence that different parts of the country be given an opportunity to see the annual airshow displays of airpower.
- Industry of Defense to provide adequate hotel facilities for visitors.
- Labor Day competition in Dayton from the local Montgomery County Fair.
- Seven other cities—Inglewood, Ft. Worth, San Francisco, Milwaukee and San Diego—have made bids for the show.
- Overall Value Declined—While Erdmann speaks confidently of his plans for an exhibition in another city in 1970, industry and military circles continue to

debate the overall value of the air show as a public relations medium for the aircraft manufacturers and the cause of aerospace.

Death of Maj. John L. Armstrong, in the crash of his F-4E Phantom II, may be the year's last day program caused talk of the hazards involved and the absence of interest of the public in the event. Coverage of the continuing racing was abandoned after the 1969 Cleveland meet, in which Bell Orders was killed, along with a mother and baby, when his plane exploded into three halves.

• **Navy Doubts**—A high ranking Navy officer told *AirPower* that he had a majority of his Navy colleagues are convinced that the air show is "not worth the effort."

He added: "All of the armed forces spend a modicum amount of time and manpower and money on this contest and I am not convinced we need it."

Airports has told it. It is not like it was 30 years ago when people did not understand the potentiality. Now it has

demonstrated in World War II and with developments since that time."

The Navy does not take part in competitive events at the air show and has consistently refused to consider any contributions from the industry, except for contributions. In its defense, pilots are from the private business community. The Marines had no air demonstration the year due to operational and training considerations.

► **FV Air Show**—Talk in industry circles has focused mainly in the past two years to the idea of replacing it by implementing the air show with an annual corporate report by television.

Arguments by advocates of this idea include:

- A nationally broadcast program would attract millions of listeners. The air show this year drew a total crowd of 200,000.

- Nationally recognized figures from the President to the Air Secretary and leading defense officials could take part in the program.

- Industrial and space events could be televised from regular military test centers or used from film, eliminating the hazard of possible criticism into crowded details.

- Many things, such as the costly research, research and development work, could be shown and placed in proper perspective in the overall aerospace program.

- Files record of the broadcast could be used in a general educational program, centralized to schools and colleges.

► **Renting Power**—So far, the only effort shown thus far has been made by individual aircraft companies and the aerospace industry, through the Air Force Association.

Decision on military participation in the air show is made by the Department of Defense, which has ruled that the National Air Show is the one annual demonstration in which all of the armed forces will provide full co-operation.

The Aircraft Industries Assn. has not yet decided group support to any program, but did say an amendment to participate in the Dayton exhibit.

Defense Department policy on air show participation is being reviewed at the present time. It is understood that the services will have a tightened regulations, designed to improve the quality of Armed Forces Dev shows all across the country and reduce the amount of effort put into sponsored shows.

He added: "All of the armed forces spend a modicum amount of time and manpower and money on this contest and I am not convinced we need it."

AirPower—The U.S. Air Force provided its B-52 Stratofortress heavy jet bomber to the public at the National Airshow.

► **Each Day**—At the end of each day

Show here last week with a 62-flight, flight from Seattle to Gow-McCormick Airport.

The Boeing plane, powered by eight Pratt & Whitney Aircraft JT3D-P-8 engines, arrived via the coast route, the 1,350-mile route in 1½ hours.

The arrival, set on the opening day of the annual Labor Day "Report to the Nation," probably was the most significant, if not the most spectacular, event for the northeast crowd of some 250,000 spectators.

Other highlights:

- In the annual Boeing Trophy event for fighter planes, Capt. Edward D. Keeney, Jr., of the McDonnell Douglas pilots a Republic F-105G Thunderchief from Edwards AFB, Calif., to Gow Airport, a distance of 1,900 miles, in 3 hr 1 min 35 sec.

- Powered by a Wright J65 engine, the F-89F averaged 161.285 mph. Results of the Boeing trophies last June show that last year's Boeing mark of 601.947 mph set by a North American F-89A Sabre with a General Electric J47-GE-23 engine.
- Capt. Eugene P. Sonnenberg of Eglin AFB, piloting an F-86D, won the Thompson Trophy with a speed of 592.625 mph, up from 577.250 mph last year. His plane was driven by a General Electric J35-GE-11 engine with a modified thrust setting of 3,200 lb.

- Last year's ace, 42-yr-old Brig. Gen. J. Stanley Hobson, was 590.111 mph. His plane was the North American F-86D with a General Electric J35-GE-23 engine. The world record for the 100 km, was set last fall by a Douglas Skystar at 725.11 mph. The Skystar was powered by a Westinghouse J40.

- The All-American Trophy event, taken on a new basis in its 10th consecutive year, was won by a team from the U.S. Defense Contractors' F-104A Fighting Starfighter Squadron. Lt. William J. Knight, pilot, and William K. Shireman, radar observer, totaled to 14,800 ft. in 2 min 7 sec. in a Northrop F-5E fighter with two Allison J35 engines.

- The winners were determined by developing the first from the photo station camera panel, plus five bonus points had been given off on the winner of three interviews and made a pass at a B-52 bomber once each during the 10 days.

- Sponsored by Ingersoll, the General Electric trophy event, 580 mph closest course speed test was won by Maj. John L. Armstrong of the Wright Air Development Center, Armstrong, Syring an F-5BII, set a world record for the lowest day below. His or plane opened, then was lifted in a second attempt to better his own mark on Sept. 5.

- Armstrong's figure was 619.302 mph well above the old record of 427.1 mph set in May of this year by Capt. Anders Wennerstrand of Sweden.

- Each day at the show, a flight of



**HENDER TROPHY**: Wayne Capt. E. W. Keeney arrived ahead from M. P. Engle.

12. Boeing B-47 Strategic bombers, powered by six General Electric J47 engines, flew over the field on a routine trans-Atlantic mission from England. After passing the course, they proceeded to their bases at bases in the United States.

► **Captain Ananoff**—From a standstill of 6000 ft. and the spectators' deafening roar of an F-104A cockpit, the Air Force demonstrated the aces. However, both Navy and Army provided other aircraft programs showing off new capture and flying capabilities.

To leadoff position on the program, the Army staged a mock helicopter assault demonstration with infantry and artillery forces down onto a moving cable, clamped by a mock atomic shell blast. The famous helicopters again came down from Ft. Rileigh, demonstrated precision flying, and lightplanes were shown in typical Army style.

The Navy put on an exhibition of the flying ability of the Chance-Vought F-8HII Corsair, as well as a performance by the Blue Angels, Navy aerobatic team. The Douglas A-3D Skywarrior performed a solo takeoff.

Navy's aerobatic demonstration included performances by the Bell HUL-20B refueling tankers and the Northrop T-38C pulse-jet biplane.

► **F-86H Scramble**—Death of Maj. John L. Armstrong was the highlight of the 10th Annual Airshow. Armstrong, flying an F-5BII, set a world record for the lowest day below. His or plane opened, then was lifted in a second attempt to better his own mark on Sept. 5.

Although USAF officers in the air show did not confirm that the F-104 was grounded, it was clear that the plane was grounded from further performances. About 10 days before the show, another USAF air-



**THOMPSON TROPHY**: Capt. Sonnenberg. Capt. Joseph McCaughan, Jr., was killed in a plane accident in California. After the show was closed, Air Materiel Command declared that the F-8HII was grounded, pending outcome of an investigation into Armstrong's crash.

Capt. Sonnenberg, who sat his Thompson Trophy mark in the F-86H the day before the air show opened, did not fly it in his deployment of the aircraft for the crowd on Labor Day. He was shifted to an F-5B.

May Gen. Alton Ward of WADC accepted the General Electric Trophy. Armstrong's widow and her two sons, Andrew and Michael, were present.

► **Warrior Order**—Features of the air show included:

- USAF planes, led by Korean war, Maj. Frederick Blane, opened their part of the program each day in 12 flights that drove bases 145,000 ft. to heights 12,000 feet above the airport.
- Their Lockheed F-94C Starfire demonstrated a remarkable mission with planes parked in front of the stand where the crowd could see how Defense Command ground crews and pilots get

## Air Race Results

**Dayton**—The U.S. Air Force provided its B-52 Stratofortress heavy jet bomber to the public at the National Airshow.

► **Each Day**—At the end of each day

Show here last week with a 62-flight,

all the ground fire absorption of possible enemy bombs.

- Bell's wing load and interception experts used a B-52 to evaluate the Lockheed SC-171 radio payload plane, the PHMC, P-HD and P-HD. The fighters shot down numerous aircraft during trials to 18,000 ft.
- The Army helicopter demonstration included the Paesano H-21C. Wall Horse transport and the sub-super-cooled Sikorsky CH-39 helicopters, new holder of the world speed record (Aviation Week Sept. 6, p. 16).
- An F-107 was selected as model from the belly of a Convair C-36 bomber.
- A Boeing CH-37 Chinook demonstrated various refueling techniques with a B-57 Stratofortress.
- Convair F-102 supersonic interceptors made daily flights.

## Static Exhibits

Dayton—Exhibits by the aircraft industry at the National Air Show, with 57 aircraft displayed, exceeded last year's show by 90%.

The industrial exhibits covered approximately 61,000 sq. ft. in three buildings at J. M. Cca Massicot Airport. The aviation services held a static space allocation. Sale of space in commercial exhibition national about \$55,000.

Easy stage engine and airborne cameras were represented in the "Re past to the Nation" of U.S. air strength. ▶ Classified Projects—Lockheed Aircraft Corp.'s display created curiosity from spectators with several models of new projects labeled "Classified." These included the F-104 nuclear aircraft project and a nuclear and solid rocket project. However, mention of the projects was approved by military security officers, who said configurations of the covered models were accurate.

Among the items of new equipment featured in other displays:

- Len. Inc.'s blind flight instrument, the "Navi," which features a simplified, graphic representation of the terrain in front of the aircraft.
- Lockheed Aircraft Corp.'s remote-controlled and transcribed, computer system in the Boeing B-57.
- Bendix Aviation Corp.'s major developments displayed their latest developments, including a two-motorized electronic bar and an ultrasonic cleaner that transports waste leaving the cleaning solution barrels to a mobile and mobile surface part cleaner house.
- Hamilton Standard's new 150-hr. Test Hydrostatic protractor, and on Lockheed's turboprop RTV-2 Super Constellation (see Int'l p. 18).
- Solar Aircraft Co.'s new ground power unit for starting jet aircraft. The unit

is powered by a small gas turbine engine (about 50 hp).

- Emerson Electric Research Corp.'s T-2V-5 light insulation, produced for the Navy. It is the first insulation of its size to be built into a trailer for movement from one base to another, Kroc claimed.
- Hughes Aircraft Co.'s 2.75-in. Mighty Mouse anti-aircraft, showing the folding fan of the weapon.
- Military Aircraft—Included in the military displays were:

- Bell X-1A, which recently set an altitude world's altitude record of 96,000 ft. (Aviation Week Aug. 10, p. 15); and holds the world speed mark of 1,650 mph (Aviation Week Dec. 21, 1953, p. 7).
- Fairchild's C-123 Avion, an assault transport.

- North American's F-108 Super Sabre.
- Douglas X-3 experimental model.
- Northrop X-5 experimental model.
- Army's surface-to-air Nike, Navy's surface-to-surface Regulus and Air Force's surface-to-air Matador.

The Boeing B-52 bombers was not included in the general exhibit at Caa Airport. Following its flight from Milwaukee to Dayton on the first day of the show, the aircraft was based at Wright-Patterson AFB and made its flights there as the following two days.

Military exhibit was limited to two or three aircraft and punch and die areas showing Marine support and defense techniques. There was no Marine demonstration because of heavy operational and training commitments, officers said.

## Seaboard Gets First Cargo Super Commissaries

Seaboard & Western Airlines, riding high in the wake of a \$10-million Aircom contract for trans-Atlantic cargo and passenger flights over the next six months (Aviation Week Sept. 6, p. 7), is taking delivery on the first of Lockheed Aircraft Corp.'s newest version of the all-glass Super Constellation in the second month, both can operate cargo and passenger equipment, Bruno said.

Early converted from all-passenger to cargo planes, the new Super Commissary has the following features:

- Cruising speed of 315 mph.
- Max cargo compartment that is 15-ft. long.
- Capacity for 71 hospital patients when necessary.

Colonel Africano said that the inter-island cargo would be implemented because it duplicates CAP's medical service from Milwaukee to Miami via Washington National, expressed the fact that the government would give Eastern control over north-south service in the East.

Bruno noted that the advantage to the public outweighed other considerations and advised the Board to approve.

aptaine. This new combination of proved design and speed will permit us to make more trips closer to the vast potential of trans-Atlantic freight."

Meanwhile, Civil Aeronautics Board received another request to reopen the trans-Atlantic cargo route, this time from Overseas National Airways (ONA) wants the Board to take another look at ONA's proposal on the grounds that the freight airline has been violating the Civil Aeronautics Act by operating a regular frequent service in the Atlantic area.

ONA also has appealed to the Board's atomic open slot rule to the President, asking for a moratorium. The board holds that the letter's purpose is to "concern the Board and the President of the United States and associated Seaboard a firm Atlantic cargo certificate."

## NWA-EAL Through Service Proposed

Interlineage agreement between Northwest Orient Airlines and Eastern Air Lines (EAA) has come from Minnesota's Paul in Florida to Dallas to Dayton on the first day of the show, the two were based at Wright-Patterson AFB and made its flights there as the following two days.

The proposed service could offer two flight-day roundtrips a day between Minneapolis-St. Paul and Miami and two round-trip Milwaukee, Texas and Atlanta. Roundtrip service flights would run daily between the Twin Cities and Miami and Tampa.

Advantages—The interlineage offers advantages to both Eastern and Northwest since it allows both to cut costs of idle equipment. During the summer the interlineage will move the trans-Atlantic flights from May to October.

Through the use of Northwest's DC-8s and 727s in the winter and Eastern's Super Constellations in the summer months, both can improve cargo and passenger utilization of equipment, Bruno said.

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- Max cargo compartment that is 15-ft. long.
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SIKORSKY XH-39 cargo, powered by Avcojet turbine and developed from S-51, features enclosed loading gondola, four-blade main rotor. It cruises at 115 mph. New engine already in use at 136,000 rpm, over a 1-km. course at Wadsworth Locks, Conn.

## New Copters

- Bell shows 47G-1 utility craft at Wright-Patterson.

- Sikorsky flies turboshaft XH-39 at Dayton show.

Dayton—A new low-wing utility helicopter, designated the 47G-1, was demonstrated last week at Wright-Patterson AFB by representatives of Bell Aircraft Corp.

The aircraft was not put on display at the National Air Show, but got total attention due to the first appearance of the new Sikorsky XH-39 (53-38), turboshaft-powered aircraft that may well be a new helicopter speed record of 116 mph. (Aviation Week Sept. 6, p. 10). It was flown during the Avionics show demonstration by the second holding pilot, Wiesner Officer Billy E. Winter.

▶ Lesser Maintenance—The 47G-1 is reported to be the first of the division's new generation of the smaller Model 47, but the 300-hp Pratt & Whitney radial engine is to be replaced by a Lycoming O-435-6 dentalized from 280 to 315 hp. The new engine at the same time will be used in the Aero Commando and Twin Beech.

Bell representatives say damping of the engine will result in a helicopter that can hover in ground effect with less than 70% of normal rated power. It also is expected to reduce storage space costs.

Other features of the 47G-1:

- The Lycoming engine will be certified for use with any fuel and will have a maximum power rating of 250 hp.
- The engine will improve high-altitude and hot weather performance.
- The helicopter will operate with 2,550-lb gross load, including four persons 40 lb. of luggage and fuel for a range



BELL 47-1 Kompanion (foreground) has enclosed landing gondola; it uses a more powerful engine. At top is Bell's turboshaft 47G demonstrator, "Sean White."

of 200 cu.

• The aircraft ceiling will be in excess of 16,000 ft. and the hovering ceiling will be more than 5,000 ft. in ground effect.

• Since reduced the weight, compared to the earlier versions, it is less likely to become stuck in low areas or have difficulty getting off the ground, according to the pilot giving the demonstration.

The new Sikorsky twin-blade helicopter is powered by a Turbocraft Avrocopter II, 450-hp gas turbine engine. Winter, who has flown it about 10 hours, says tests so far indicate the engine will set new standards for helicopter smoothness, ease of operation and maneuverability.

Cruising speed of the XH-39 is 125 knots (138 mph) with a useful load of 1,130 lb. Sikorsky says Cruise ceiling is at 15,000 ft., and fuel consumption at cruising speed is 55 gal per hour.

The Sikorsky helicopter is an experimental project sponsored by the Army to test the practicability of the turboshaft engine.



**TURBOPROP SUPER CONNIE** shows off new PW-VA T34 engines before taking off on first flight at Lockheed's Burbank, Calif., plant.

## Turboprop Connie Draws Airline Interest

Airlines are taking a long look at Lockheed Aircraft Corp.'s new turboprop-powered Super Constellation, claimed to be the world's fastest propeller-driven transport with a design cruise speed of 440 mph.

The latest version in Lockheed's Connie series, powered by four Pratt & Whitney T34 engines, made its first flight Sept. 1 at the company's Burbank, Calif., plant.

► **Airlines Interested.** The fast-to-takeoff aircraft already has won the RTV-2, a military personnel-cargo transport version built for the Navy. Lockheed says it has a contract to build two RTV-2 prototypes for the Navy and is pending an additional two, designated the YC-130P, for the Air Force.

"The transport also has a terrific potential for commercial operation," a company spokesman said.

He reports that every airline now flying Super Constellations, "plus a few that don't," are watching development of Lockheed's new turboprop with interest.

► **Long-Run Lease.** Lockheed says the turboprop transport is capable of making 35 nonstop flights as nonstop transoceanic flight in less than six hours, bettering by at least two hours present nonstop routes across the Pacific. (See Aug. 30, p. 52.)

It can do trans-Atlantic routes with east-to-west (New York-Center London) nonstop and three-quarter hours, the company says, with the return flight from London less than six hours.

The RTV-2, 44-ft long, seats 40 passengers or 20,000 lb of cargo, plus two crew members, with 350 miles range. For the British, Britannia, 360 seats, for the Douglas DC-3, 91 seats. For Vickers Viscount and 100 for Convair's Turbo-Liner.

C. L. Johnson, chief engineer at Lockheed's California Division, says the turboprop Super Connie would use over 10 tons 5,000 hr with full fuel reserves.



**MAJOR CHANGES** from Navy RTV-1 are thicker propellers, stronger leading gear

► **Easy Conversion.** Under current development for the past two years, the new version does not differ greatly in configuration with Super Constellation now in operation with airlines.

Previous models of the series now have the basic structural features of the turboprop transport, a Lockheed spokesman says. Conversion of those aircraft would require only the 7,500-lb PW-VA T34 plus new needles, longer controls and accommodations plus a landing gear system standard for RTV-2A (lower break) weight of 118,000 lb.

An airplane that distinguishes the turboprop from earlier Super Constellations is its large, round, over-the-wing exhaust outlet behind each of the prop engines.

► **Turbo-Hydrocycle Prop.** The new transport's turboprop engines use an



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## New Ag-2 Nears First Flight Test

All-metal Transland spray/duster has the crash-safety features of Ag-1, is designed for good performance.

A new agricultural plane, specially designed to combine good load and performance characteristics with crash safety, will fly for the first time later this fall at Terrebonne Municipal Airport, La.

Designated the Transland Ag-2, the craft at first glance strongly resembles the Texas AGM Ag-1, designed by Prof. Wink.

The Transland is a substantially Transland-purchased the remains of the Ag-1 after the plane tangled with a power line during a demonstration and was completely written off. Because of the Ag-1 design, the pilot walked away unharmed. Wink, Aug. 24, 1953, p. 15).

Transland collected detailed comments from about 600 pilots and operators who have flown the Ag-1 and these have proved valuable to Transland in their new project, he says. Prof. Wink, who is serving as consultant on the Ag-2.

Features—The Ag-2 has all metal surfaces, using aluminum alloy skin wherever possible and aluminum compound, carbon, fibreglass and carbon.

Simple construction is used through-

### AG-2 Specs

Weight empty	2,749 lb.
Cross weight	5,200 lb.
Take-off weight	11,220 lb.
Fuel capacity	100 gal.
Cruise speed (50% power)	110 mph.
Landing speed	64 mph.
Landing gear (no wheel)	64 mph.
Takes off over 50 ft. obstacle	1,120 ft.
One wheel, loaded	
Distance to land over 50 ft. obstacle (no wind, loaded)	3,610 ft.
Rate of climb, loaded	900 fpm.

out to make the plane easy to manufacture and repair. Standard wrenches and tools will always satisfy all requirements, with specially designed tools to be provided where needed. There is a 15-in.-dia. tool and equipment storage area under the cockpit.

The wings made up of four solid wood panels with full sheetwood

The two main panels, containing the main landing gear, are bolted together to the fuselage at four points. Four anti-sway points also join the outer panels to the inner sections. Wingtip stabilizers and fairings are soon attached.

The wings made up of four solid wood panels with full sheetwood

The outer panels serving as airfoils.

When the flaps are lowered for a turn or maneuver, the elevator is turned automatically.

Transland purposely has used a mix

of Cessna 181 trimmers to keep the price down, but allows

any aircraft designer to add them if desired.

The Ag-2 uses the 180-hp Pratt & Whitney aircraft engine and accessories, modified powerplant mount, cooling and propeller, nose landing gear and wheel, tail gear shock strut, instruments, landing lights, radio panels and pilot's seat.

► Safety Features—Like the Ag-1, the pilot's cockpit in the new plane is placed high to provide maximum visibility while flying, making low-altitude turns on the flat ground.

The Ag-2 structure is designed to absorb crash impact progressively, with the cockpit introduced as an "isolated safety" cell that will remain intact after the engine, wing and fuselage have taken the brunt of impact. Fuel tanks are in the outer wings.

The cockpit incorporates a hammer switch, over-the-earphone, dual directional and radio microphone. It is sealed to prevent closure

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- Oil spray or dust from entering. Pilot's seat and shoulder harness are capable of holding a 400-lb. load. No heavy cargo seats are required all of the cockpit.
- Spray/Dust Dispenser—The Ag 1 is both solvent in applying equipment—press gun tank, hopper spray boom and sprayer.

There are separate systems for handling solids and liquids. The dust hopper sits in the fuselage ahead of the cockpit, and spray tanks are in the wings. A simple switch automatically allows the pilot to activate either system with a single lever.

The 35-cu. ft. hopper haulage hopper holds 2,000 lb. of low density material compared with the Ag 1's 37-cu. ft. of spray. The Ag 2's liquid capacity is 350 U.S. gal., compared with the Ag 1's 150 gal.

- Five Prototypes—Plans are now being finalized for five Ag 2 prototypes at Tandem's El Segundo plant.

The company will make the plane available in three ways:

- Complete factory plane, approx. \$65,000.
- Fly or ship to ET-13 for parts removal. Price will be for the Ag 1 without less ET-13 parts later, plus labor.
- Complete aircraft, less ET-13 parts, for dismantling to lower. Kit includes re-assembly instructions.

## European Airlines Emphasize Comfort

By James Montague

Comfortable on red ground travel with a minimum of red tape are being given major consideration by European airline and airport authorities.

Comfortable begins with bus service and by the development of airports at London. It comes finally in the fact that the airline has and continues to hire passengers who have proved government controls must then place at the Zurich-Kloten Airport in Switzerland.

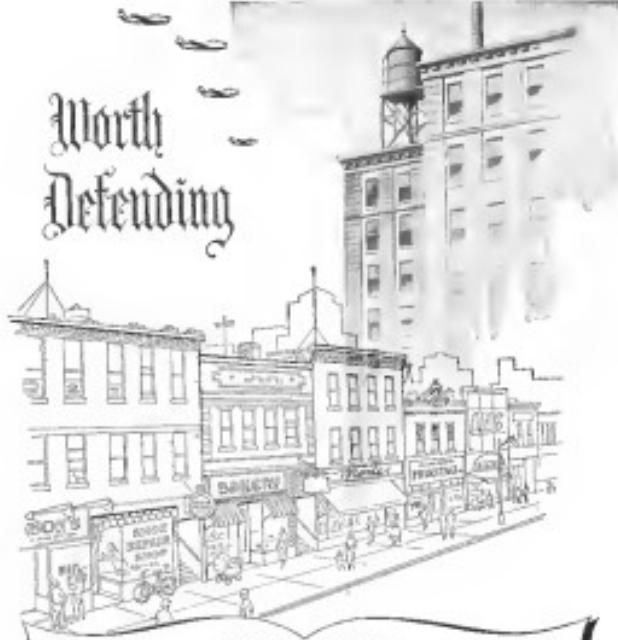
• Red Tape. Millions—This writer did not have to open a log at any airport during a three-week tour of Britain and the Continent, watching how controls function at various international terminals. None have developed to add the passenger.

Passenger efficient check-in counters, luggage control offices sit about the traveler's needs from customs offices to airport baggage. Every airport, except those in Switzerland have passenger and customer controls. Northerns did it take more than five minutes to date the fare analysis?

• Leisurely Tempo—The leisurely European tempo is noticeable in the absence of restaurant and bar facilities at airports.

The bus terminal is the route of

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### FREEDOM OF ENTERPRISE

In a free society a man may work for himself or work for others... own his own small shop... or build a factory.

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0900 Starting up on their work stands, two crew members saddle up engine cowling.



0906 Quick disconnects of J47 electrical, fuel, and oil lines are completed.



0911 Crews roll engine forward as replacement unit rolls into background.



0914 Engine is swung away from wing as new J47 is pulled into position.



0919 New engine locked in while crew tests J47 fuel, oil, and electrical lines.



0924 Absent "bullet nose" and cowlings are clamped on jet before running engine up.



## Simple design of G-E J47 helps S.A.C. crew make 25 MINUTE ENGINE CHANGE!

McDill AFB photos show how G-E engines, Boeing wing pods, and S.A.C. ground crews have cut bomber maintenance time and costs

A Strategic Air Command B-47 ground crew recently changed a G-E J47 jet engine in 25 minutes. We mention this for two reasons: twenty-five minutes is about one-eighth the time it used to take to change a WW II boxer engine. And the 25-minute change is typical of the ways in which the J47's clean design and durability help S.A.C. save time and money.

### Good design: Easy maintenance

The J47's relatively simple construction makes the engine very easy to maintain, compared to older types of powerplants. For example at MacDill AFB, S.A.C. crews get up to 600 hours from J47's before major repair. This is nearly twice the minor repair

average of 5 C-portion engines. And naturally the cost of J47 maintenance—and the human effort involved—is less.

### Good design: Long operating life

Proof of the J47's durability lies in the fact that 15 G-E's attached to the 300th Bombardment Wing have gone more than 600 hours without a single engine change. That's the equivalent of 15 nonstop global circumnavigations. A Tampa newspaper has quoted a B-47 ground crew as calling their J47's, "The engines that never quit."

Facts like these illustrate the J47's contribution to the Strategic Air Command. Section 231-2, General Electric Company, Schenectady 6, N.Y.

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**J47 JET MAINTENANCE** is illustrated by this photo of a S.A.C. B-47 aircraft with wing pod. J47 installation can be completed quickly for minor repairs and overhauls.



**LONG JET OPERATING TIME BETWEEN OVERHAULS** is typified by S.A.C. Mc 10234 of SAC 300th Bombardment Wing. Aircraft flew more than 600 hours without a single engine change.







VARIETY of shapes and sizes is turned-holed. At start . . .



STAINLESS steel blank is held between mounted tool and tool.



IN FIVE MINUTES flow forming is done, part is ready for trimming (5). Blank and mounted tools at about 400 rpm. during forming.

## Flow-Turning Speeds Metal Forming

Jet engine parts are being formed cold by flow forming at Pratt & Whitney Aircraft.

This process for forming metal to the shape of a mandrel by controlled rotation requires simple tooling, gives maximum economy, saves flow, improved structural strength, small waste, and very considerable time.

**How It Is Done**—A cold flat sheet or enough bar stock forging is held

against the mandrel by a hydraulic ram. While the part and mandrel are rotated (about 400 rpm), a separately mounted roller exerts a large force (about 25,000 lb) against the work surface. This pressure gradually takes the shape of the mandrel.

A variation of metal spinning, flow forming is reported as readily learned after a short basic training period, easily fit for greater adherence to closer tolerances. From a modest production standpoint, spinning is, on average, dependent upon the skill of the craftsman and the variety of his tools. PWA's new flow-forming processes can compete favorably.

**More Applications**—The company has流formed a number of different types of parts—cylindrical and complex shapes. Some control parts previously were impossible to turn out

## 127 New Departures Join the Navy!



Westinghouse J-40 jet engine with Inlet Guide Vanes, Variable Control for the afterburner, where 127 New Departure ball bearings contribute extreme reliability and efficiency.



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Among other applications in the SKYRAY, there are 127 New Departure precision instrument ball bearings in its Westinghouse Exhaust Nozzle Actuator Control. This control maintains proper engine temperature, and demands the utmost in bearing accuracy and efficiency. New Departure uses these demands.

Throughout defense and industry, you'll find New Departure making good products even better. Learn how these fine ball bearings can help your design . . . talk with your New Departure engineer today!

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**BALL BEARINGS**



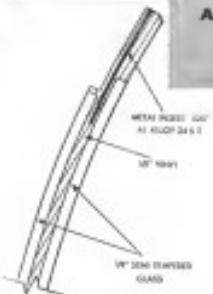


**How semi-tempered, single curved  
Flexseal Duplate is used in the  
North American F-100 Super Sabre**



A report from

**THE PITTSBURGH  
AIRCRAFT GLAZING  
FILE**



The North American F-100 Super Sabre is America's first true supersonic operational jet fighter. This sleek aircraft with its unique high-wing has a service ceiling of above 42,000 feet and a combat radius of more than 500 miles.

Metal inset Flexseal Duplate is used in the F-100's soft windshields as indicated in the sections at left. It consists of two plies of  $\frac{1}{8}$ " thick, semi-tempered polished plane glass and a  $\frac{1}{2}$ " vinyl filler. The overall nominal thickness measures  $\frac{3}{8}$ ".

The 500 sq. in. windshields measure  $16\frac{1}{2}'' \times 61\frac{1}{2}''$ . They have a depth of  $3\frac{1}{2}''$  with a radius of bend of approximately  $54''$ .

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with a conventional die because the metal fractures.

One example cited by PWPA is a "test compressor housing support." The technology involves a multiple component insulation package developed by the company's team who is the world's best in the field. Starting with a 50-lb density, PWPA had to get in 20 different machining operations not more than four hours to finish out a finished piece weighing 14 lbs. This meant 16 lbs of scrap, various temps and tool wear-requiring stops.

For flow forming, only a 27-lb rough forged disk is required. Rough machining takes little more than an hour to cut off excess material, and about five minutes to run out the 25-lb part.

Flow formed parts have greater tensile strength, and twice the stress resistance because they are considerably stronger than the machined counterpart, PWPA say. The grain always is in the same direction of flow-tension metal.

Idea for the flow-forming machine was conceived by Arthur A. Meany,



**FLOW-TECHNOLOGY** part is heated from die side, old way required 20-lb forging, lots of machining and scrap.

PWPA's chief of advanced tool engineering, The machine was built by Lodge & Shipley to PWPA specifications. Three of the units are at PWPA's East Hartford, Conn., plant.



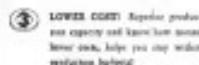
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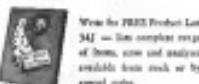
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WHAT DO YOU NEED  
TO TAKE A  
TAILPIPE TEMPERATURE?

FOR ONE THING,  
A GOOD HARNESS.

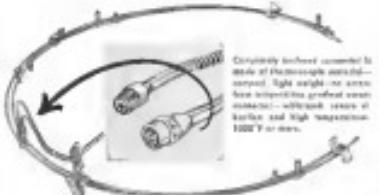


It's tough to take the temperature of a jet's tailpipe. Severe vibrations and extreme changes in temperature can wreck measuring equipment. Yet, the information is vital to men who build the engines used by the planes.

The harness used for the job must be rugged enough to survive brutal operating conditions. Jetson mass tested now that engine thrust and temperatures are taking interest.

T-Jet has several solutions to the problem, and the eight, bullet-type harness shown below is one of them. Extruded wire is protected from the heat, corrosion, and vibration by one-piece, stainless jackets which are fused with pressure welds. Positive and negative conductors are jacketed separately for compactness and ease of installation. Harness will be supplied with open end and crimping thermocouples.

Briefly, it's a well-made harness that can take lots of punishment and high temperatures.



Cooperatively developed by T-Jet and Thermo-Electric, this unique temperature-measuring harness features prefused strain resistors—without concern of kinking and high temperatures (1000°F or more).

Get in touch with us. Let us help solve your temperature-measuring problems.

Pyrometers • Thermometers • Protection Tubes • Solid-Ceramic Connectors  
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**Thermo Electric Co., Inc.**  
SADDLE RIVER TOWNSHIP, ROCHILLE PARK POST OFFICE, NEW JERSEY  
IN CANADA—THERMO ELECTRIC (Canada) Ltd., BRAMPTON, ONTARIO



### 'Home-Made' Press For Fuel Tanks

Labor and material costs have been reduced up to 94% using this 15-ton hydraulic 'press' press built from salvaged or scrap aircraft parts, its designer, Paulinus Avantus Corp., Los Angeles, reports.

Pilotmen first used the press to punch and punch a difficult-to-reach portion of today's contemporary with a large aircraft fuel tank. The tank had been cut and bent some. Drilled by hand as required, the operator would take 6 to 10 hours, not including heating, and require \$300 in tooling, gauges and minor fixtures, the firm states. In one press shot the tank is ready in only 10 sec., using a gauge and block die casting, 5000.

The machine uses a modified aircraft landing gear cylinder for a hydraulic unit, with landing valves being plane-type coupled to a four-way control valve, solenoid-operated from last switch. The automation type hydraulic system, designed and built by Paulinus, has power requirements from 3 to 15 hp. to 50 psi.

A low-volume 1-gpm pump, operated at half speed, supplies the hydraulic circuit at operating efficiency.

### PRODUCTION BRIEFING

► Douglas Aircraft Co. is getting off a \$17 million, three-year assembly contract to build the new A-4 Skyhawk Light-weight Navy bomber. Plant is to be completed by November.

► Canadian, Ltd., Montreal, is constructing a building to house its foundry and plaster shop, glass shop, tool plate and photo template reproduction areas and pattern shop under one roof. Total floor area will be 139,000 sq. ft. All templates for Canadian's aircraft reconnaissance version of the Bristol Beaufighter will be made in the new factory.

► Curtiss-Wright Corp., Wood-Ridge, N. J., has negotiated license and manufacturing agreements with four German

**Phil-trol**

## Data for Relay Users

### Relay Requirements Fulfilled More Easily By Greater Diversity of Phil-trol Relays

New Features, Wide Choice of All Components Create New Flexibility of Phil-trol "Standard" Units

A recently developed relay manufacturing technique enables users to package the different components of a standard relay in a single housing to provide considerable economies in a tight weight miniaturized relay.

Other new methods developed in Phillips' new relay plant have solved many previously unsolved problems which formerly have required complete redesigning from scratch. In many cases, new can be produced in a fraction of the time required for redesigning in past over-modified designs.

Code as a wide assortment of winding types and characteristics are now attainable without loss of reliability. These include various relay ratings, Series current ratings for varying ambient and timing values as easily fulfilled, as are requirements of unoperated, latching response and release constants.

The contact, addition or omission of springs or interlocked pins as easily. And variations of various forms and types of special mounting devices are standard practice in Phillips.

#### Power Relay Series Complete

Representations of switch and switch contacts are now available in both series and shunt types to meet almost all needs in the design and construction of relay units.

The Type 27QA, line-shunting relay, Phillips' most popular power relay, is now available in this field. It has been universally accepted by leading aircraft designers as the ideal relay for aircraft communications and control, as well as for standard electronic measuring equipment and test equipment.

A comprehensive Phillips catalog of aircraft power relays is immediately available to engineers and designers. It contains all the information necessary to insure that the right relay will meet specific flight and ground requirements with maximum savings in cost.



Phil-trol  
Type 27QA  
Relay

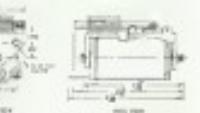
This Type 27 Relay is available in 1, 2, 3, 4, or 5 pole models, with single or double coil operation, with ratings up to 1000 V.C. maximum, up to 15,000 ohms. Minimum operating current is 100 ma. Available in dust cover, or hermetically sealed (as shown above at right).



New Home Plant for Phillips  
This new, modern, dual-line plant, in El Segundo, Calif., has evolved to keep up with the company's rapid growth. It consists of a large main building, a smaller addition, a tower, and a separate laboratory building.



After the glass bell jar is closed, all excess air is exhausted. Each enclosure case is exhausted to a few cubic inches of pressure, reducing all traces of moisture in gas, then flushed with chemically dry nitrogen. After cooling, there is no residual heat left and dry nitrogen is used to cool the relay to a lower temperature than before. This makes the relay more reliable.



1.5 in. wide  
1.5 in. high  
1.5 in. deep

#### Twin Contacts Give Phil-trol Type 8 Relays Exceptional Reliability

Demands for reliable and functioning relays in applications where rapid opening and closing of contacts is required result in the design of the Phil-trol Type 8 Relay.

These relays feature high reliability with complete response matched adequately for required operation, with fast positive and negative contact closure. It is important to note that the two interlocked contacts, the Type 8 Relays are given "T" springs, providing them with two contacts operating in every desired direction. Long life testing confirms the remarkable performance of operation.

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A Division of Phillips Control Corporation

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I am particularly interested in Phil-trol Type 27 Relays

Phil-trol Type 27A Relays  Phil-trol Hermetically Sealed Relays

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Street \_\_\_\_\_

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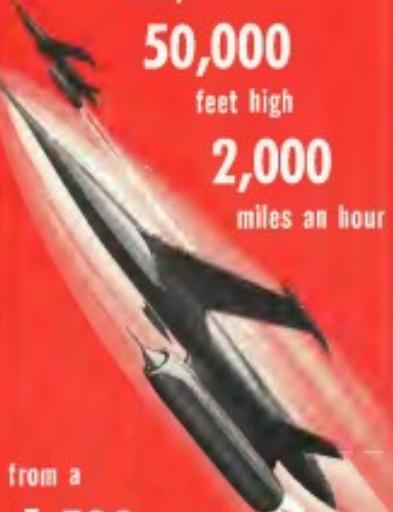


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Relay Problems

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feet high**

**2,000  
miles an hour**



from a

**1,500 lb. engine**

lb. sec.

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San Diego, California

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and Soviet Ernst Maiburg C.W. has eight production prototypes in development and laboratory trials, including designs for mounting, connecting and maintaining them in existing established aircraft to make the new equipment. A special showing of the designs is planned for individuals in November.

► **Mechanized hoisting plans for ports** up to nine years are being advanced by Massachusetts Jones & Laramore Machine Co., Springfield, Vt., covering port, dry docks, basins, basins and three graving docks, special construction and threading dies and other special designed items. Total estimated price is approximately \$100 million, with rental payments being fully deductible for numerous purposes. Terms can include option to buy. J&L engineers will survey customer's plant and work out modernization plans, if required.

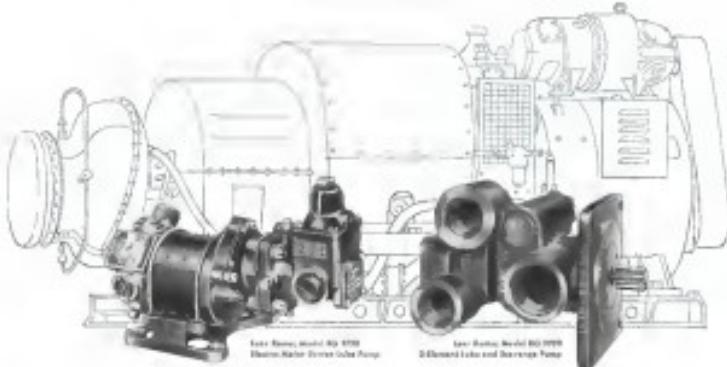
► **E. F. Goodrich Co.**, Akron, Ohio, has purchased assets and business of Sponge Rubber Products Co., with plants in Shifnal and Derby, Conn., Mid River, Maine, and a Canadian subsidiary at Waterloo, Quebec. In addition to its line of rubber products, the firm also makes aircraft pressure vessels. Goodrich will operate its activities in a division with SRF president Frederick Duke and vice president managing Wallace Toddle retaining their position.

► **Continental Can Co.** has been awarded a new contract to build Crownover SIP I cowlings and a new order for night tracking equipment for the Army. Firm expects total annual and defense sales exceeding \$10 million for the first half of 1954, bringing its backlog to \$45 million.

► **General Electric Co.'s Chemical Materials Department**, Pittsfield, Mass., has established an experimental shell-making facility with complete facilities for casting molds and pouring casting. The facility is equipped to make test shells and pour castings from customer's patterns on GE equipment.

► **Aero Design & Engineering Co.**, Oklahoma City, is creating a research and development engineering division to be located on MacArthur Field near the University of Oklahoma School of Aerospace Engineering. The new division will handle design studies, development and flight test to improve the firm's products.

► **Texaco Aircraft Corp.**, Crossville, Tex., is negotiating a Convair 340 for exclusive use of the government of Saudi Arabia. Included is installation of armaments and defensives in that and three other 340s mostly purchased by Saudi Arabian Airlines.



### How to meet critical "lube" problems of gas turbines

Solar Aircraft Company does it with two Lear-Romeo pumps in its "Jeepie" 300-hp gas turbine Auxiliary Power Unit, designed to provide emergency power aboard American Naval ships.

One Lear-Romeo electric pump drives oil to the jetpipe's "hot box" compressor seal turbine shaft bearings and to its reduction gears during starting and operating. As the turbine comes up to 25,000 rpm running speed, a second, specially designed Lear-Romeo engine-driven pump takes over. With rated capacity of 6 gpm at 90-80 psi, this pump forces a quart of oil per minute through each shaft bearing and through each lubrication point in the gearbox, simultaneously lubricating the air frame bearings and gears in the oil reservoir through two separate elements.

Lear-Romeo has also designed and built lube pump for Solar's Frisbieengraft "Mars" 500-hp gas turbine, which is used to drive AFU's in Douglas C-124 and Lockheed Super Constellation transports. In addition, Lear-Romeo has designed and built pump for the Boeing 362 utility jet turbine, and for General Electric J-47-301, J-47-627, J-53 and J-58 jet aircraft powerplants.

These installations are typical of Lear-Romeo's ability to design and produce liquid and air pumps and associated products in specific customer needs. Lear-Romeo offers year guarantees in pumps and other special purpose fluid handling. Lear Inc., Lear-Romeo Division, Elkhorn, Ohio.



**LEAR** LEAR-ROMEC DIVISION





**CONTEAVES EOTS** is electro-optic tracking system for keeping missiles or planes in sight. Flashes and bearing angles are recorded on M-mat film for permanent record.

## New Tracker Pinpoints Missiles

One of the newest available tools for locating a missile or airplane in space is the Conteave EOTS (Electro-Optic Tracking System), a Swann-developed photo-fotodisc now available through Collins Radio Co. & Arms Corp. of America, Atlanta, Ga.

Several of these units are already in use at the Air Force Armament Center of the Air Research and Development Command, Eglin AFB, Fla. They have been modified for tracking balloons during pattern and deorbiting tests (Aviation Week Aug. 17, 1953, p. 22).

Collins says the accuracy of the new system is better than 0.1 mil, or one part in 100 thousand.

System Setup—In addition to any optical tracking system, the Conteave units can be used in quantities of two or more, because the information output is basically a precisely defined lightline. Two or more sightings are needed to define a point location.

The other stations act synchronously by a master station which transmits pulses through a VHF FM radio link or through direct fiber connection.

Each photofotodisc unit consists of the portion of the target on its own film. This speed can be adjusted for any two

speeds between four and 30 frames per second, depending on the speed and accuracy desired.

Each frame locates the target in terms of bearing and elevation angle with respect to the reference site of the first frame. Site of the target on the film frame is also measured to prevent visual check of the altitude.

Power Adds—The Conteave unit is power-down, and normally controlled by two technicians who are sighting telescope images held on the target. One man operates the elevation keyboard, and the other operates the bearing angle keyboard.

Position of the keyboard defines the angular velocity of movement, and the change of position of the wheel controls the displacement of the unit.

Remote positioning or color coding can be installed as optional features.

Accuracy accuracy is a predetermined flight path-fusion generator. This does not mean that the instrument measures flight path into the Conteave and the new data has to make corrections for the deviation of the target from the calculated flight path.

Linear Video—Collins offers three diodes of the Conteave.

- Operating limits, 1,000 to 30,000 miles range (3,200 ft. to 58,900 ft.); axis 10 deg. in plus 100 deg. elev. bearing angles and unlimited bearing angle.

- Tracking speeds, 30 deg./sec. maximum speed in elevation and transverse axes; speed better than 1/200 deg. per sec., maximum acceleration, 100 deg./sec. squared.

- Precision: Readout accuracy, 1/500 deg. static accuracy, 1/300 deg. dynamic accuracy, 1/100 deg.

A film reader is being developed by Gerkin's of Elkhorn, Neb., the idea is to take the film recordings and transform them into IBM punch cards to be fed to an IBM automatic typewriter. Preliminary discussions on the reader show that there is four data bytes per card and recorded per minute with a reading accuracy of 1/1,000 deg.

Although the Conteave was developed and is being produced at Somers, lead agents and servicing are handled by Delco-Rand Corp. in the centers.

## Military Report Lists Rocket Fuel Hazards

A significant report on the health hazards of rocket propellant fuels and oxidizers, has recently been issued as a joint document publication.

Specific hazards and countermeasures are described for these fuels under, fuel-air alcohol, hydrazine, methyl alcohol ethyl alcohol and JP-4.

The oxidizers considered are nitrogen oxide and RPNAL, white-fuming nitric acid (WFNAL), liquid oxygen and 98% hydrogen peroxide.

"Health Hazards from Propellant Fuels and Oxidizers" is published as AFM 11-10 MED-242, May 20, 1955, 2,915 and AFM AFP 160-6.7.

## Aircraft Firms Win Tax Amortization

Offices of Defense Mobilization has approved applications for research tax amortization on funds expended by the following firms:

North American Corp., Wichita, Kansas;

Aerospace Manufacturing Corp., Victoria, Calif.; aircraft parts, 414747.

United Aircraft Corp., Portland, Oregon; military aircraft, 1889-600.

North American Corp. & Div. of Pan American World Airways, Inc., 411174.

North American Corp., Ft. Worth, Texas, 1212-217.

McDonnell Aircraft Corp., St. Louis, Mo., 1807-148.

Lockheed Aircraft Corp., Burbank, Calif., 1000-1000.

Yale Auto Power Inc., Stamford, Conn., 2000-1000.

General Electric Co., Schenectady, N.Y., 1000-1000.

Rockwell Standard Co., Danbury, Conn., 1000-1000.

Rockwell Standard Co., Danbury, Conn., 1000-1000.

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# COLONIAL'S REMARKABLE all-time air safety record

Without a single accident  
involving fatality or  
serious injury to a  
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24 years of continuous operation  
750,000 landings and take-offs  
2,500,000 passengers carried.  
725,000,000 passenger miles flown

in advanced, dependable electronic aids  
and navigation equipment.

We are proud that Colonial has maintained an air safety record second to none—  
one that employs the safety standards being established throughout the airline industry.

Colonial's slogan, "Safety is my accident," is summarized by constant attention to safety rules and regulations; careful selection and training of personnel; dedicated promotion and enlisting of the best



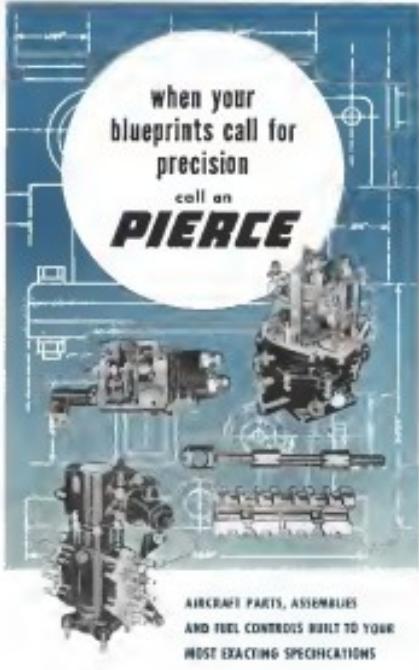
Donald P. Goss, President of Colonial Airlines, emphasizes the firm's record of safety.



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#### In Brief . . .

##### 'Accidents Too Accidental'

What should be the purpose of the engineer who wants to test the limit of safety in airplane operations?

He want first of all deserves laurels in the operational options, many of which have only probability, often great risk, as their starting point, say Mervin H. Shad of Garrett Aerocarrier Laboratories, as a paper quoted by flight Safety Foundation. "Not all will be equally good at this," says Shad, "but if it is an ability we should work with more."

Milner further suggests that a particular operational option can be called "lucky," he will then to use all his knowledge of the structure and operation of the system to demonstrate the extent to which it is safe. He points out that there is one situation which may occur in actual operation where the type could be lucky. Whether the hazard will actually play a role in accidents is impossible to determine, but the engineer must be sure that they paid heed to make maximum of relative hazard. It is the same entitles moral.

"When the end of research is good, we have a problem in mapping hazard life into the number of cycles of use of the hazard which demands in varying problems of all. In other words while life essentially demands that taking of risks, in transportation it is undesirable to take any unnecessary risks, however small."

"Concerned improvement of the safety record requires us to know how to detect and eliminate the risks which are built into the operational system in potential hazards in these rare events we call accidents," Milner concludes.

#### UK Expands Titanium Production for Planes

Development of a titanium industry to supply metal for aircraft manufacturing is moving forward in Great Britain.

Local step was the purchase by W.G. Bassett & Sons, Sheffield, of former designs and operating knowledge for the making of titanium and titanium alloy metals from Vickers Metals Corp.

Titanium Metal's president, E.B. Kowalewski, says organization for a similar plant are underway with a small British company.

Completion of Britain's first titanium plant likely now in setting construction, at the Imperial Chemical Industries plant, which will have a capacity of 1,500 tons a year.

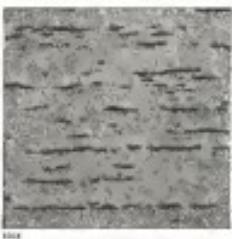
Current U.S. output production is approximately 4,000 tons a year. The goal is 15,000 tons a year by 1975.

# Only GRAPH-MO® gives you all three advantages in one tool steel

**Wearability**—Outwears other tool steels 3 to 1

**Stability**—Is the most stable gage steel ever made

**Machinability**—Cuts machining time 30%



**Y**OU can make gages and dies that are stronger longer and produce them faster by using Graph-Mo® graphitic tool steel. That's because only Graph-Mo gives you the combination of wearability, stability and machinability that you want in a tool steel.

Free graphite and diamondoid hard carbides in the structure of Graph-Mo steel give gages and dies extraordinary life. Repairs from users show that Graph-Mo outwears solid carbide 3 to 1.

In your plant, Graph-Mo steel will cut production time and rejects. Because of its graphite structure, Graph-Mo steel machines 30% faster than other tool steels. This structure also gives excellent resistance to shearing, and has minimum tendency to pick up, scuff or gall. Tests on Densel Wear Machine show Graph-Mo has twice the resistance to galling when compared with ordinary tool steels.

Results of free graphite in its structure, can't be duplicated in ordinary steels. The photomicrograph at left shows the free graphite and diamondoid carbides that give Graph-Mo unusual wear resistance.

Write today for more information on Graph-Mo steel. The Timken Roller Bearing Company, Steel and Tube Div., Canton 6, Ohio. Catalogue, "Timsteels".

TRADE SHOW REFERENCE AND SELECTION

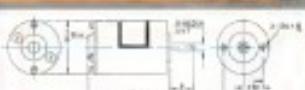


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**APPLICATIONS:** Microphones, precision instruments, controls, electronic cameras

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are sprung from switches located 27 ft above the center of the propeller.

The propeller, made of aluminum alloy, is driven by a hydraulic motor which has a maximum speed of 3,200 rpm. To provide safety against propeller failure, the motor is protected in a housing which at its weakest point is made up of 6 in. of wood, 1 in. of steel plate, 6 in. of sand, and 1 ft. of reinforced concrete.

One of the problems of the research program was development of a remote switch which would produce a contact potential of 120 volts, yet would not interfere with switches having an average diameter of 1/8 in. 5% below the seat surface and yet turn no switches on and one rotated to open up and the other down.

## Air Remover Stops Sealant Troubles

A new device for removing bubbles from instant seal with sets gun tail seals and pressurized cabin air seals has been devised at Boeing Airplane Co. The device is used to eliminate troubles that occur occasionally in high-altitude flight as a result of expansion or air bubbles trapped in the sealant.

Precious methods of avoiding such losses have required a painstaking hand operation—"padding"—which involved threading the compound with a sharp instrument that pierces the bubbles.

Boeing has resolved a sealant gun to overcome this difficulty. A .453 pipe was cut from a spool through a fine body of sealant into a piston gun chamber and out through a hole in the bottom of the cylinder cap. A thin coating of the sealant compound stays in the wire or fiber passes through the sealant container and is scraped off and left inside the gun chamber as the wire runs through the tube to the bottom. When the cylinder is filled, the wire is removed, the hole plugged, and the gun is ready to fire down a



MURKLESS-FREE instant封胶down...was through holes in car's bottom.

AIRPORT WEEK, September 11, 1960

# A single brake fire costs you more than converting to SKYDROL



## Cost of Brake Fire: More Than \$3000

### Look at the Figures for a 4-engine aircraft

Replacement parts alone, without labor, total about \$3000. Far greater than this is the cost of out-of-service time...the problem of interrupting schedules...non-scheduled removal from service...loss of passenger pay and meal pay.

## COST OF A BRAKE FIRE\*

(Replacement Parts Only)

Gty.	Brake	Net Price
2	Brake Assembly	\$ 829
3	Tires	\$66
2	Flexible Hose Coax.	20
2	Wheels	3015
1	Nozzle Switches and Wiring	53
2	Brake Lockout Cylinders	240
2	Shuttle Valves (Brake)	60
	<b>TOTAL</b>	<b>\$3946</b>

\*Caused by ignition of flammable system fluid

## Cost of Conversion to SKYDROL: \$1700

At time of overhead, you can convert a 4-engine aircraft to fire-resistant Skydrol for approximately \$1700...less than the cost of a single brake fire.

Nonflammable Skydrol is the only fire-resistant hydraulic fluid to receive CAA approval...it has never been implicated in an aircraft fire...Skydrol has exceptionally high lubricity...lengthens pump life...extends aircraft oil.

Twenty major airlines now use this Monsanto fluid in more than 800 transport-type aircraft...Skydrol is available all over the world...at more than 70 airports outside the U. S. A. alone...

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# AVIONICS



TROUBLE-FREE TUBE OPERATION for 1,000 hours is demanded by Avco, as study of avionic equipment in transport operation shows...

## Airline Tube Reliability Curve Goes Up

By Philip Kline

A large airline such as the DC-7 or Super Constellation with more than 300 electron tubes should, should want to operate for 1,000 hours with very little likelihood of a single electron tube failure. This is a rather remarkable achievement in view of airline experience with tubes over a five-year period.

Based on nearly one year of cloudy maintained airline tests on previous-type tubes, Aeromarine Radio, Inc., reports that "a tube failure rate of 0.1% (one failure per 1,000 hours) for the first thousand hours of operation should be attainable at the present time under optimum practical conditions of operation."

The Avco tests were conducted to provide a benchmark for comparing tube reliability of avionic equipment. (Aviation Week Aug. 3, p. 52; Aug. 19, p. 30) with that experienced in the ordnance field.

► **Detectable.** Detectability—equally significant, the Avco airline tests conclude that the test results of tube failure rates (93.4%) in previous tests are of the detectable type, which can be detected prior to failure with sensible

tube equipment. Only 6.6% were the unpredictable, catastrophic kind.

Avco's 11% estimate of first plane-years optimistic in the face of the 0.5% to 1.5% failure rates actually experienced in the tests. However, these figures are based only on the original 2,000 tubes which started the program in July 1953; hence were manufactured during the past year. Since millions of tubes have been used since, most of them in a result of the airline test findings.

Another factor is that higher failure rates were generally experienced in older war surplus equipment, like the ARCI VHF set, whose design parameters were less conservative. The same tubes showed up much better in newer avionic equipment. One of these participating tube manufacturers was responsible for a preponderance of the high failure rates, indicated as inferior design and/or manufacturing problems.

► **Tests Were Run-for Avionics.** The PAA, Eastern, Northwest, United, PWA, and Pan Am—participated in the Avco tests. The three tube makers—General Electric, Kerfleau, and Tungs—Sel—were referred to as "B," "E," and "C" in the Avco report to prevent

competitive retribution.

Approximately 2,000 tubes of eight different types were installed in four loads of airline avionic equipment: the Calfin SIR, omnirange receiver, the ARCI VHF communication set, the ME-53 audio amplifier, and the ME-251 communication receiver. Not all 20 tubes tested at tube break, nor in all tube types of the eight sets.

Seven of the tubes were improved (Avco) types 5694, 5614, 5684, 5673, 5751, 5816A, and 5199. One was the GAKS conventional counterpart of the 5674.

► **Cross Checks.** In some cases, a specific tube type made by two separate tubes was tested in identical equipment by a single airline for comparative purposes. In still other instances, the competitive tube was run by one manufacturer to check out differences in individual airline maintenance procedures.

Whenever a tube failed, it was tested by service personnel to determine if possible, the general type of failure and a report was filed with Avco head quarters. The tubes themselves were returned to the manufacturer for a detailed failure analysis, which in turn was reported to Avco. At Avco, all

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**ATTACK ON CATASTROPHIC FAILURE** of engine tubes is made with the procedure which triggers glass overflows to strengthen them against later cracking.

data was recorded as punch-cards for speedy analysis and telephones.

• **Test Procedure**—Here are some of the other Aeronic mechanisms tested on test to date:

• Failure rates remain fairly constant up to approximately 3,000 hours of test time, after which they increase rapidly, indicating that even premium Inlet

leaks do not last after a few

- Reliability of improved tube bypass system to be tested presently by the aircraft oil control that can be exercised over every detail of tube manufacture.
- Deterioration factors were greatest due to leakage between tube joints and capsule, or between other tube bodies, resulting from conducting flow

depended on the sealing parts. Low tension due to stress was responsible for only a minor percentage of tube failures.

Aeronic notes that difficulties of outside materials as sealing parts have long been recognized as a major cause of tube deterioration. Tube interests know and others are attacking the problem. Aeronic says, but it adds that some research must be devoted to the lower cost tube leakage problem.

Catastrophic failure was primarily due to cold glass overflows (3.4% of all receivers), open headers (1.7%), and open capsule film (1.2%). Aeronic adds that it does not know how many of the residual tubes were damaged during handling and transportation. It notes that 50% of the open headers were type 5654 tubes used as the ARD-1, demonstrating evidence of press crest damage.

Aeronic stresses during operations tests did appear to have caused any of the damage noted in reference to specific aircraft, except for one tube type made by a single manufacturer.

• **Competitors**—Deterioration—Header leakage and transconductance deteriorations were the principal defects encountered in tubes made by company A, Aeronic says. Meanwhile, B's general problems were with capsule-tube bonding and gas. Pneumatic test



## Here's Better Vibration Control in Less Weight and Space!

General's unique rubber in metal designs can drastically reduce damaging vibrations in aircraft with less weight and space than other vibration control devices. These lighter weight units are ideal for landing gear, aircraft engines, propeller nacels, credits and flaps and other engine parts where vibration is a problem. In addition, General's unique product offers the advantage of reduced radio, radio, navigation and other electronic apparatus from being jarred.

We have a successful record in designing and producing products to offset vibration in aircraft. For complete details on our products and services just fill out the coupon below.

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Pump Model No. 0218604 Pressurized-Loaded Fuel Pump with relief valve. For turbojet engine applications. 40 gpm @ 6000 rpm and 3000 rpm. Weight approximately 23.5 lbs.

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# LOOK what EPON® in the



Epon® Resin-Free Adhesive permit instant assembly after cleaning and no welding or freezing.



Epon® Coatings next attack of aerospace industry. Body, fuselage, nacelle, wing fairings—reduce construction costs.



Epon® Resin-Free adhesive permit instant assembly after cleaning and no welding or freezing.



Epon® Resin-Free adhesive holds all aircraft tanks for jet engine start systems that are light, strong, and shatterproof.



Epon® Resin-Free adhesive permit instant assembly after cleaning and no welding or freezing.

# RESINS are doing Aircraft Industry-



Epon resins, representing a new kind of plastic, have won immediate recognition in the aircraft industry because of their remarkable physical and chemical properties.

In interacting harmoniously, we tools, and motor blades, aircraft has Epon resins give instant assembly. Extra extremely strong bonds.

Coatings based on Epon resins give outstanding protection against solvent, corrosion, extreme changes in temperature, and weather action. Epon coatings can easily applied, will not chip or peel,

and will withstand hard knocks and abrasion.

Epon potting resins safely embed delicate electronic components, protecting them from moisture, shock, and rapid temperature change.

Epon resins are used for painted aircraft finishes, because of their high cohesive properties and dimensional stability. Due to their high strength-to-weight ratio, laminated sections made of Epon resin are light, durable and strong.

Your letterhead request will bring more information and samples of Epon resins.



Epon® Potting Compound protects delicate electronic assemblies from moisture, shock, and temperature change.



Epon® Laminate slightly porous epoxy protective coatings because of their mechanical strength and adhesive characteristics... they attain the excellent dielectric properties at extremes of temperature and humidity.

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For . . .  
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produces  
fire  
bombs  
efficiently



PASADENA, CALIFORNIA BAYTOM, OHIO WASHINGTON, D.C.

ble for manufacture. G. van leakage between electrodes, Anne says.

Anne complements the participating tube makers for their keen interest in its voltage tests and their cooperation in analyzing the cause of tube failures. As a result, Anne says, it believes that present tubes now being made will have better schedules than those used in its tests.

### \* FILTER CENTER \* 00020

**Type IF Amplifiers**—Intermediate frequency amplifiers, only one-eighth the size and one-half the weight of common broad bandages, were developed recently at temperatures of -65 to 200°C. and have been developed by National Bureau of Standards. Techniques are described in NBS Circular PH, entitled "Monolithic Intermediate Frequency Amplifiers," (46 pp.), available for 40 cents from Government Printing Office in Washington.

**Stacked Transmitting Tubes**—Increased plate dissipation made possible by stacked construction of Sylvania's recently announced vacuum tubes, according to company engineers, is believed to have led to smaller stacked construction which could reduce the use of transmitting tubes.

**Stabilization Flow Notes**—Watch for General Electric's Motor Department to announce a new version of its mass flow meter (AVIATION Week Sept. 30, 1953, p. 715) which uses air flow rates to individual engines as an diagnostic aid, permitting a single indication of total fuel flow rate.

**New RTCA Monitors**—Companies recently elected to membership in the



Range Stretcher

USF transmitter extends the range of air force VHF communications equipment from the 5240 ft. limit of the standard projector night communication USF transmitter. Type TW-60 transmitter is made by Aircraft Radio Corp. for use with Type 12 VHF set, which starts its modulation when the 5240 ft. transmitter is added.

AVIATION WEEK, September 12, 1958



## New DOUGLAS DC-7 Uses New VICKERS® Variable Displacement Hydraulic Pumps

Cobin supercharger drives on the new Douglas DC-7 are the largest known variable delivery aircraft hydraulic pump . . . the new Vickers PV-391E. Like the DC-7, the PV-391E is an outgrowth of previous successful designs.

The pump is a development from similar but smaller pumps used in the DC-6, DC-6A and DC-6B. The basic application was so successful it was adopted for the new DC-7. The new pump provides a 14.7% increase in flow capacity with only a 30% increase in weight. A special feature of the PV-391E is an overtravel control which automatically limits the maximum pump delivery

and accordingly provides another safety check on compressor impeller speed.

For further information about the numerous advantages of Vickers Variable Displacement Plunger Type Pumps, ask for Bulletin A-5203.

## VICKERS® Incorporated

A DIVISION OF THE ALLEN COMPANY  
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Additional Sales Offices: Atlanta, Ga.; Boston, Mass.; Chicago, Ill.; Cincinnati, Ohio; Denver, Colo.; Los Angeles, Calif.; Milwaukee, Wis.; New York, N.Y.; Philadelphia, Pa.; St. Louis, Mo.

ENGINEERS AND BUILDERS OF OIL HYDRAULIC EQUIPMENT SINCE 1921

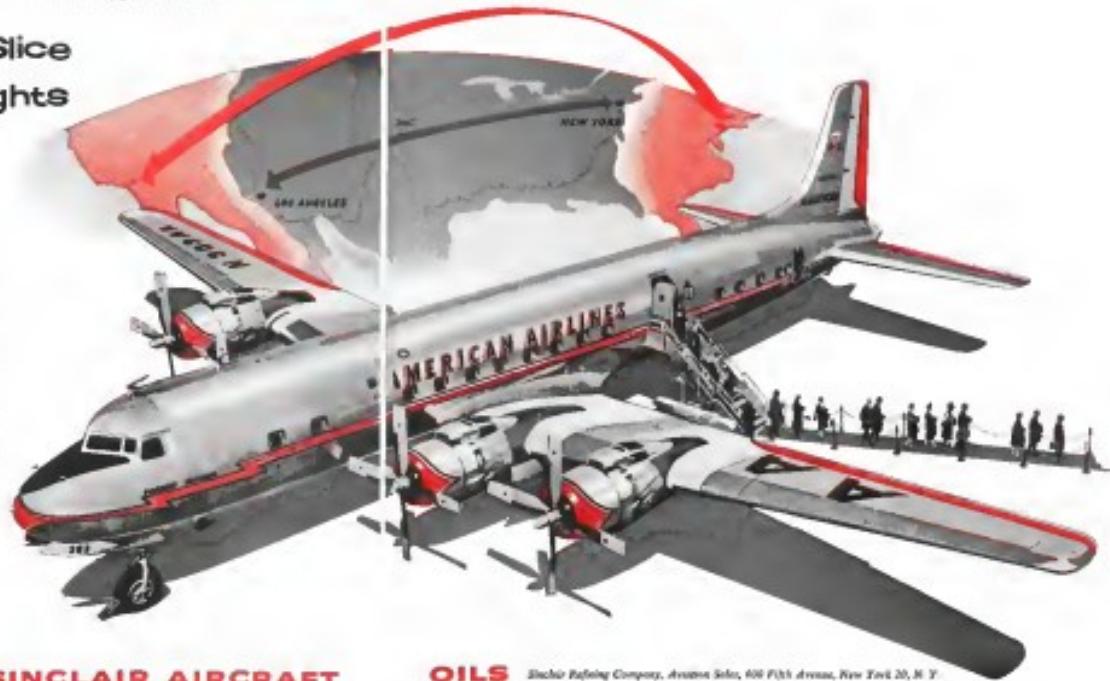
SINCLAIR HELPS AMERICAN

# "shrink a continent"

**DC-7 Flagships Slice  
3 Hours from flights  
to Los Angeles**

With the introduction of its new DC-7 Flagships, American Airlines has added another page to the recorded feats of U.S. aviation. Powerful new 3250 hp "Turbo Compound" engines speed these specially designed transcontinental planes through the skies at a record 365 miles an hour. As a result, today, DC-7 Flagships are flying non-stop coast-to-coast in under 8 hours!

For more than 29 years, American Airlines has used Socony Aircraft Oil to protect its powerful engines against heat and friction. This strong role of confidence in a single product is made even more emphatic by the fact that, today, more than 43% of the oil used by major scheduled airlines in the U.S. is supplied by Socony. Why don't you place your confidence in Socony Aircraft Oil?



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**Cppc's SIZE 10 SERIES SYNCHROS**

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In quantity production . . . available for immediate delivery . . . a true high performance series of standard Size 10 Synchros . . . 1 1/2" diameter.

Minimum weight—1 lb. on, light! Mag. ratios of spectrum proportions are both 1000:1

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Another product of the engineering work which pioneered precision synchros.

LOOK TO **CPPC** FOR SYNCHRO PROGRESS

**CLIFTON PRECISION PRODUCTS CO., INC.**

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**PENNSYLVANIA**

Radio Technical Commission for Aeronautics website:

- Northeast Airlines, East Boston, Mass.
- Stick Aeroplane, Rockland, Calif.
- Western Corp., Louisville, Western Electric Co., Inc., New York
- Defense Navigation Systems, Inc., New York

ATCA has moved its Secretariat office to T-5 Building, which also houses the CAB and CAA. New mailing address is Room 3016, T-5 Bldg., 10th & C Sts., Washington 25.

► **Melville, N.Y.** Test for GE-Milbank: Airlines will operate a facility purchased by GE as a flying laboratory to test mobile equipment developed by General Electric's advanced electronics research lab, located near Melville's main base of Elmsford, N.Y. Tests are expected to run for one to two years.

► **USL, Bayard, Calif.**—United Airlines has awarded 226 NACA 103A glide slope receivers to Raytheon Radio for a fleet wide installation. New receiver has 33 channels compared to an earlier one-sided USAF receiver. Results describes the order as "the largest of its kind ever placed."

► **RCA, Kotzebue, Alaska.**—RCA Corp. of America, which is actively working on digital clearance computation and data processing research, is under contract to set up an electronic inventory system, called Boreas, for Arctic Oilfields.

► **Schiff's Technologies Report.**—Schiff's Technologies, Technologies for Low-Temperature Recovery, is the title of a new \$1 prep report by the National Bureau of Standards covering the second phase of an continuing program to develop instrumentation for subzero equipment. NBS Circular No. 543 may be obtained for \$8 cents from Government Printing Office, Washington 25, D.C. —PK

### Avionic Bulletins

Recently announced bulletins and catalog of interest to persons in the aerospace field include:

- **McDonnell.** Jet aircraft to assist the construction of transonic wind tunnel. In addition, a transonic wind tunnel, McDonnell, T-2, has been developed.
- **Bristol Aeroplane Co.** Wind resistance study report, Bristol, England.
- **Boeing.** Laboratories for flight simulation, Boeing, Seattle, Wash.
- **Fokker.** Two new aircraft instruments are described. Fokker Int. Division Manufacturing Co., Wilton, Fla.

- **United Aircraft.** Called "Primo," new electronic flight control system from United Aircraft Research Center, 1000 North Temple City Blvd., El Monte, Calif.
- **A. C. Greenberg.** On-shore permanent magnet synchronous motor with reduced dimensions of 20.4" x 26.8" and a maximum torque of 20,000 ft-lbs. A.C. Greenberg Co., 1000 Clay St., San Francisco, Calif.

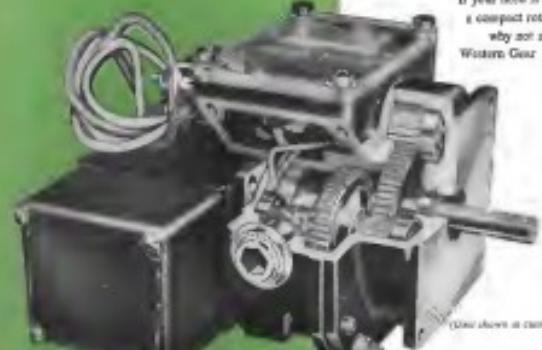
# Really Versatile

## this WESTERN GEAR ROTARY ACTUATOR!

This versatile rotary actuator has been modified for many custom applications, ranging from dropping wing-tip tanks to opening and closing camera doors.

If your need is for

- a compact rotary unit;
- why not investigate the Western Gear Model 1524.



(Unit shown at customer)

### CHECK THESE SPECIFICATIONS:

Model 1524

110 volt single phase, 600 cycle reversible motor with torque: Ratio 96:1, 10,000 RPM input — 1000 RPM output. Weight: 10 lbs. — 1000 hours of torque. Shipping tolerance plus or minus 10 degrees. Operates to 60,000 feet altitude. Thermal Protection. Optional accessories or equipment include overtravel limit, emergency hand crank, G. C. motor.

Hundreds of other type units in prototype, in linear and rotary designs, are available as well. Call or write for no-obligation service of a skilled Western Gear application engineer.

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1996

## **ROCKET POWERED KNOCKOUT**

Military leaders must provide uniting

defense at supersonic speeds. RMI rocket propellants can provide high performance meeting established military requirements.

interesting positions with a permanent future are available for experienced Engineers, Chemists, and Physicists to staff our expanding Research and Engineering facilities. Send resume to Personnel Director.

**RMI**

RMI ENGINES POWER THE  
LAWRENCE RIVER MARINE  
FISHING FLEET. LAUNCH & TUGBOATS  
AND OTHER INDUSTRIAL VESSELS.

REACTION MOTORS, Inc.

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## QUIPMENT



EXTRAMURAL research is funded by Center letters on some projects.

#### Jets Try Fast-Opening Fastener

new quick-operating units are designed for highly  
several models of high-speed aircraft and missiles.

Grant & Gwinne

**Panman, N.** J-Cyclic Estimator  
is ready to swing into production  
as a new type fastener for high-speed  
and massive applications.

Called the *Epsilon*, named panel system (EPS), it can fixture quickly and highly stressed metal panels used in modern aircraft. It is a unique load range restraining device with greater pending torque life than conventional fasteners, according to its manufacturer, yet retaining the quick operating feature of a quick-turn screw.

The SFP is being tested by Chasen Wright for the FBI and on nuclear and Slavonic testing & for unknown applications, according to Arthur Fox, Lincoln's aviation sales manager.

device, which is used to work on the control panel.

In the case of an anisotropic material the distance between the inner and outer boundary of the unit cell which are built according to the theory of anisotropic elasticity, and since only about a three-quarter part of the shell completely lacks the feature as opposed to the zero for a standard system, would on average prove slightly reduced.

\* Rapid operation. Continuous flow is used in "hotmilling" or "reprofiling" (no engine cranking, for instance) by means of the three-quarter turn locking feature, thereby cutting machine

• Blushing causes your looks, allowing you to look deadly and avoiding having a confused view and possible cross-threading.

- Flag surface of the mud stones that only the proper length is used. If the flag or two third's a yard is used, it will not last. And because the working takes off other loads, the load that is to be popped up by spring action, immediately flagsging the fact that it is unfastened. It also obscures the possibility of mounting a snow dot after to do the job, thus weakening the line.

- High vibration resistance of the stud is attained since it is held in the lateral position by a spring loaded detent pin. SPT easily vibration test requirement of AN-N-38, according to Caudle.

\* **Steel assembly** is secured to the outer panel assembly when inflated, preventing it from falling out when panel is removed.

\* Angle establishment tolerances are defined by feature recognition.

- Depth of #3 Phillips head screws and permit application of at least 50% of torque on the stud.
- Last screw problem is eliminated by permanently attached short screw(s).

The SFP Series 4P features nearly the structural requirements of NASA (National Aeronautics Standards) 547 types A and B, class 1, size 1, ratings goal, a low, high strength balance, according to SFP.

**► How it Works:** When the stud is inserted the first 30 deg., the stud end begins to dig into two depths of the wood as in Fig. A and continues to dig, digging all of the wood to the condition shown in Fig. B which shows contact with the stud and a reversed down-spiral of the fastener tail as the fastener was threaded. This action drives the panel securely to the wood structure.

If the sled is either too long or too short, it will not engage with the start and is pushed partially out of the

# THE NORDEN DIGITAL CONVERTER

In answer to the demand for a compact, accurate means of translating analog signals into digital form, Bendix introduces the remarkable new Norden Digital Converter, now available, ready shipped.

## UNPARALLELED OUTPUT OF 12 DIGITAL SIGNALS LOW POWER LOAD

Bendix has no equal equipment for this purpose. Not only will we supply the highest output of 12 binary digits (total count of 4,096), maximum resolution of 12 bits, and minimum power requirements, but our unique design features a direct digital conversion. The torque load is 0.2 m-oz.

## INTEGRATED SIZE, MAXIMUM ACCURACY

With D.C. or self-excited, only 1.25" in diameter and 1.25" long, the Norden Digital Converter is able to maintain accuracy within ±0.001% . . . or ±0.004% in absolute.

## COPIES OR COUNTS CONTINUOUS OPERATION

Either D.C. or self-excited, the converter can be wired to supply an accurate signal for either continuous copying or discrete counting.

Where requirements necessitate a pulse greater than 12 binary digits, a special unit can be designed.

## CONTINUOUS APPLICATIONS

With a possible range of 1,000 counts per revolution, the new Norden Digital Converter is a continuing source for measurement, control, and automation. Wherever requirements necessitate a pulse greater than 12 binary digits, a special unit can be designed.

## CONTINUOUS APPLICATIONS

With a possible range of 1,000 counts per revolution, the new Norden Digital Converter is a continuing source for measurement,

control, and automation.

## NORDEN FREIGHTLESS DESIGN

Designed for maximum performance with minimum weight and minimum cost.

## NORDEN INTEGRATED ALIMENTARY UNIT

Designed for remote installation with minimum weight and minimum cost.

## NORDEN COMPUTER TEST UNIT

Designed and manufactured to meet exacting requirements.

**NORDEN**  
Precision Products

### NORDEN TEMPERATURE UNITS

Designed for accurate measurement of ambient and remote environments.

### NORDEN FREIGHTLESS DESIGN

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Designed and manufactured to meet exacting requirements.

**LABORATORIES  
CORPORATION**  
Milford, Connecticut



CANLEC SPP in exploded view

Look closely by the stud-cylinder spring. This causes the "tagging" action which shows that the stud has not engaged and characterizes the problem (and possible danger) of having more than one stud inserted.

Today's SPP requires a hole instead of a 1/8" hole for mounting. But, says Norden, laboratory tests show that the 1/8" edge distance need not be 1/8" holes may be reamed with the 1/8" hole and then straight of the plate accurately adequate. Moreover, adds Norden, "I don't see how the job can be done any other way—at least at the moment."

He also points out that the 1/8" hardware provides much greater shear strength than does a 1/8" wire. The reduced construction of the SPP permits using a hole size very similar to that 1/8" hole.

The SPP device's initial cost is higher than a standard Conelac 44mm button or pins and post plate. However, Fox feels his additional cost is more than justified by the many features of the button—it is much longer life, greater serviceability, reduction in replacement, lower maintenance costs,



SPP UNIT in exploded view

*The Most Trusted Name in Ignition*



First choice  
for  
light plane  
ignition

Over the years, Bendix Ignition has been the choice of leading engine manufacturers and plane builders in the light plane field.

For example, Bendix magneto are widely used in such outstanding engines as Continental, Atchison and Lycoming, and are found in such popular types of planes as Beech 18s and 19s, Cessna 172s, 180s, and 182s, Aero-Cougar, Piper Comanche, Wagoneer, Piper 500, Texan, and Super Cub, Kirby, Twin Pioneer, and Ryan Super Moth.

There is good reason for this widespread acceptance in the light plane field. Long experience in all phases of aviation has enabled Bendix to develop improved magneto units to make better use of performance at prices comparable with light plane manufacturing requirements.

Again the engineering and facilities of the Scintilla Division demonstrate just why Bendix is *The Most Trusted Name in Ignition*.

### SCINTILLA DIVISION



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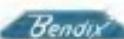
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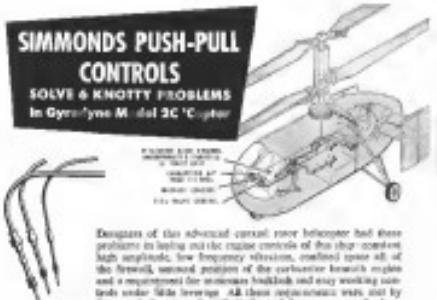


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## SIMMONDS PUSH-PULL CONTROLS

**SOLVE 6 KNOTTY PROBLEMS**  
In Gyrodyne Model 3C "Copter"



Designs of this advanced control power helicopter had three positions in landing and the maximum range of this shear control shaft angle. New frequency vibration, cushioned power off of the forward, reduced pressure of the carburetor branch engine and a requirement for minimum backlash and easy working conditions under side leverage. All these requirements were met by Simmonds Precision Push-Pull Control System—one of a long list of successful applications of Simmonds controls on advanced designs of other military and commercial aircraft.

Write for full information on Simmonds Precision Push-Pull Controls.

## Simmonds AEROCCESSORIES, INC.

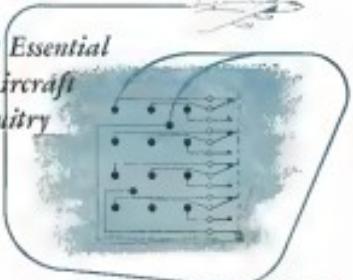
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The new VALCOR Valve is unique. The current rating is 1000 GPM at 100 psi. The new VALCOR flowing seat design has been introduced since last year. Now capacities of 15, 30, 50, 75, 100, 125, 150, 175, 200, 225, 250, 275, 300, 325, 350, 375, 400, 425, 450, 475, 500, 525, 550, 575, 600, 625, 650, 675, 700, 725, 750, 775, 800, 825, 850, 875, 900, 925, 950, 975, 1000, 1025, 1050, 1075, 1100, 1125, 1150, 1175, 1200, 1225, 1250, 1275, 1300, 1325, 1350, 1375, 1400, 1425, 1450, 1475, 1500, 1525, 1550, 1575, 1600, 1625, 1650, 1675, 1700, 1725, 1750, 1775, 1800, 1825, 1850, 1875, 1900, 1925, 1950, 1975, 2000, 2025, 2050, 2075, 2100, 2125, 2150, 2175, 2200, 2225, 2250, 2275, 2300, 2325, 2350, 2375, 2400, 2425, 2450, 2475, 2500, 2525, 2550, 2575, 2600, 2625, 2650, 2675, 2700, 2725, 2750, 2775, 2800, 2825, 2850, 2875, 2900, 2925, 2950, 2975, 3000, 3025, 3050, 3075, 3100, 3125, 3150, 3175, 3200, 3225, 3250, 3275, 3300, 3325, 3350, 3375, 3400, 3425, 3450, 3475, 3500, 3525, 3550, 3575, 3600, 3625, 3650, 3675, 3700, 3725, 3750, 3775, 3800, 3825, 3850, 3875, 3900, 3925, 3950, 3975, 4000, 4025, 4050, 4075, 4100, 4125, 4150, 4175, 4200, 4225, 4250, 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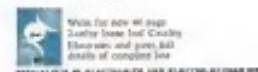
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United leases the tool, called a "clicker," machine, from the United Shoe Machine Corp. for \$25 a month. With the clicker, UAL produces over 200 different shapes, kinds and sizes of gaskets, out of rubber, leather, neoprene, cork, pressed paper, plastic, and other materials. The machine also turns out leather strips for the insulation department, felt gaskets for the fuel oil line, and UAL's own custom-made gaskets.

The clicker is mounted on a heavy cast iron stand and is powered by a 1-hp motor. A steel beam runs over the work surface, which is a 24x40-in. machined table 5 in. thick. Clicker can



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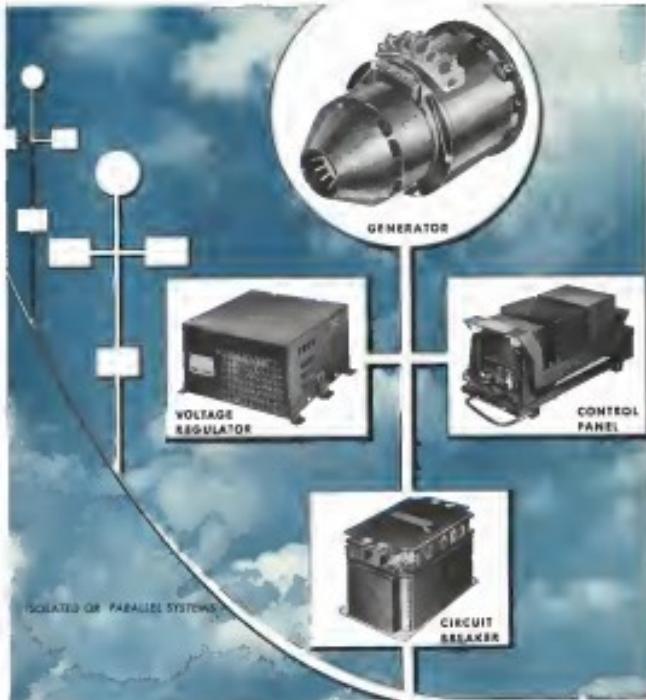
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J&H Panels include up or all of the following features (which can be supplied in individual components, if desired):

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**VOLTAGE REGULATORS:** Designed to MIL-G-8090 and applicable drawings, J&H Regulators are of the static magnetic-amplifier type. Weighting only twelve and one-half pounds, the regulator features a unique reference eliminating the use of electronic tubes. Provision is made for self-regulation for associate load division function.

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and the aircraft industry.

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AVIATION SAFETY

## *Official CAB Report on Delta DC-3 Crash*

## Pilot Flew Into Thunderstorm

## THE ACCIDENT

A Douglas DC-3, N 25149, owned by Delta Air Lines and operated as Flight 533, of May 17, 1951, crashed approximately 11 miles east of Marshall, Tex., about 1415 CDT. Of the crew of three and 17 passengers, only two passengers survived.

2008-09-09 21:48:41.803

Flight No. 40 departed Dallas, Tex., on 29 May Flight File 14, 1939, on time, for Atlanta, Ga., with a scheduled stop at Shreveport La. The crew consisted of Capt. Douglas B. Vuk, First Officer John F. Stewart and Stewardess Josephine Coffman. There were 18 passengers including one infant. The aircraft's gross weight on departure from Dallas was 24,000 lb., which was not within the allowable weight of 25,200 lb., and the center of gravity was within the prescribed limits.

Flight 111 presented normally until at 2152 reported to the company station at Langmuir, Tex., that it was this way of Gladewater, Tex. Langmuir gave the flight the brief Sheppard weather which was deck scattered clouds at 1,800 feet ceiling estimated 4,800 feet broken clouds, overcast at 26,000 feet visibility 20 miles, thunderstorms, light rain showers, wind north 35. Remnants were thunderstorms south, area lighting cloud to ground, 10 miles. Flight 8 was also given the same. In the company Langmuir spoke that he had been watching the weather over east and northeast of the Langmuir field and suggested that the flight crews wait to the south. Flight 111 increased 300'.

At 1405, on the vicinity of Morrell, Tex., the flight made a surface radio contact with Dallas Shreveport station, during which it was over the **MORSEFIELD** (BOSTON) section in 1935. At this time the flight advised it was changing course to the Shreveport Central Towns forecast.

At about 1415, four minutes before Flight 145 left the Memphis Control Tower, which allowed it to make a right-hand turn for the landing approach to Runway 15 and enter the visual at about 13 mph. Flight 145 acknowledged the message and responded that the Skipper weather watch was functioning as dark northeast clouds at 3,000 feet, flight reduced 4,000 feet, overcast at 20,000 feet, visibility 10 miles. However, there was light rain shown. The tower advised of a transponder representing 15 code units of Skipper. The transmission was not acknowledged by the flight.

At 1428, the Sheepsport Geogrid Tower made Flight 115 to give a positive report. No angle was attained, and a number of unsuccessful attempts were then made to set

fact the night. At 1425 the tower was observed that an aircraft had crashed near Marshall, Tex.

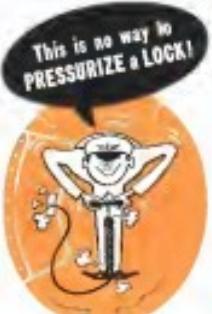
#### INTRODUCTION

The *wingless* was located approximately 1½ miles east-southeast of Mandell, Tex., one-half mile east of Highway 80 in a heavily wooded area. The author took tracks and made a study of the terrain. He found no evidence of any animal except that the small bird had struck the tree while on a slender eagle of descent, under paroxysm, an apparently weak bird which, perched on a 30-degree branch, it continued about, clutching a nearby thorn branch. The author observed the bird fly out, stretch the wings, alight, roll nose to end in a mass of wingless 250 feet from the point of initial contact with the tree. The author partially followed his flight path. There was no evidence found in the area of the bird's nest or any other bird life, either dead or alive, except those birds most common, and no evidence

Both engines and propellers were examined. Indications are that both engines were delivering power at the time of the impact and that both propellers were in low pitch position.

The company's management branch of N 33345 were classified as a part of the Board's investigation. These records showed the branch had covered the imposed over haul, inspections, and substantiations. The branch had removed its last inspection just prior to departure from Dallas. No large loads were reported. Moreover, the crew that flew the Atlantic long flights to Dallas on the morning of May 17 stated that its performance was normal.

Both the captain and first officer, bound by company procedure, reported to the Dallas operations office approximately one hour prior to departure time. During the time, the two checked the weather conditions sent via radio from weather stations.



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*Reviewed by James H. Fox, retired jazz studies professor, Florida Institute of Technology, Melbourne, Florida.*

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2. The *adaptive* approach  
3. The *incremental* approach  
4. The *iterative* approach  
5. The *waterfall* approach  
6. The *agile* approach

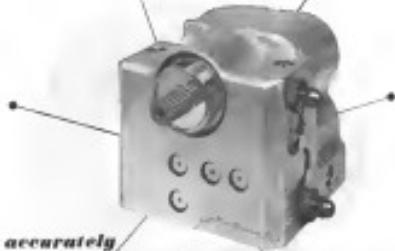
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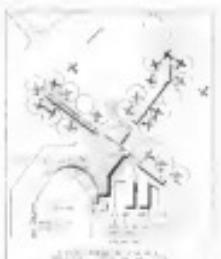
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with bases about 2,000 feet and tops to 10,000 feet.

The terrain demands for T-38s and T-39s is very severe because altitudes of 2,500 feet, maximum landing altitude at 1,500 feet, maximum takeoff altitude after 1,400 and possible land with gusts to 30 mph. after takeoff. The terrain demands for Morepower modified landing clauses at 1,500 feet and takeoff altitude at 2,000 feet with moderate climb afterwards after 1,410 and possible land with gusts to 30 mph. after takeoff. Moderate to heavy turbulence was forecast at all levels in the vicinity of Morepower activity. Also available in the flight deck were displays for ground and weather forecasts. There is a possibility of a few landings is northeast and central Louisiana and west central Mississippi that alternate molt 9,000 rpm.

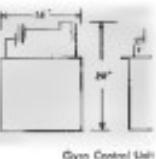
At departure from Dallas there were brief weather reports and several

**"THE WHOLE JETTY IS MISSING."** Many times during the flight, the crew was forced to maneuver around extensive water damage or isolated, scattered debris and rocks.

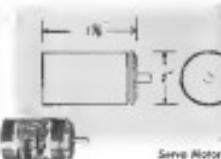


### Fort Worth, Look Out!

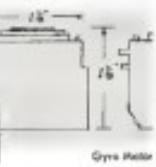
The citizens of Fort Worth, have come up with plans for a new terminal at Love Field that could put the airport among the most modern in the U. S. and is perhaps designed to accommodate larger jet aircraft. The F. W. M. Association and Comair Corp. The second, aimed for association and occupancy is late 1971, will incorporate everything built among materials, air conditioned loading pens, microwave operation. In the first stage of construction, it will be able to accommodate 22 low engine transports at the three pens, provided with Love's present capacity of 12 gates (plus four under construction). The pens can be extended to take over 50 aircraft. Future building will be kept to a minimum to fit the terrain layout and use of the moving sidewalks—the greater distance a passenger will have to walk is 200 ft. Standardized luggage conveyor may be installed if an requesting station shows them to be feasible and the owners agree to share the cost.



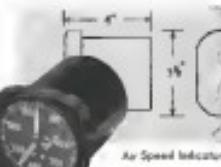
Gyro Control Unit



Servo Motor



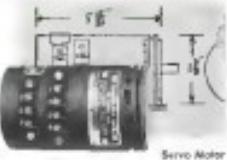
Gyro Motor



Air Speed Indicator



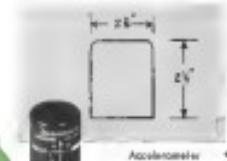
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Servo Motor



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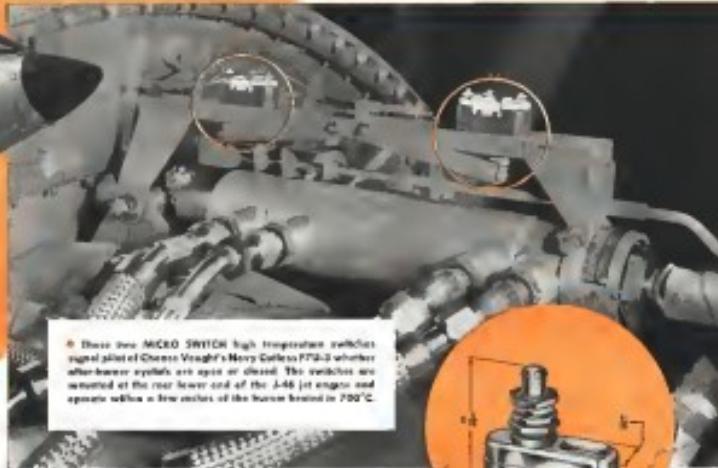
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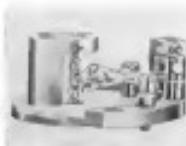
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when he approached quite close, while on his next pass, moderate turbulence was encountered. He noted every stalling that the plane had been in prior with safety. At one time while diving the plane he noted a "nose down" under the clouds dropping from the clouds to a point where a tornado developed, extending from the cloud base but not reaching the ground. He also noted that on the east side the plane was in black and threatening as up he had seen none, but on the west side, the clouds were lighter, so, it was the dark clouds less threatening offering heavy rain and rain could be seen.

Other stations on the ground near Max shall testify that the storm was quite severe. Some stated that they saw the English army marching as no cavalry division toward the station in straight and level flight. Others noted as to the intensity of the storm. They stated that there was very heavy rain with bad fog for a very short period of time. Then the rain stopped and the sun came out. At the vicinity of the coast, of course, the tornado effect such as the spinning of trees as damage to property. The one surviving passenger, who was on her initial flight, stated that the flight turned around and that she was staying west of the trip. She

"The arrival of the British squadron and the American bombers was a welcome sight to the ground crew at Llandaff AAF. This is regular procedure continually during the day and night. The British prefer to return advance time to adjust military operations to sleepiness on the ground."



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New zipper-rolled baggage compartment bins are being installed in Lockheed Super Constellations at the aircraft manufacturer's Burbank, Calif., plant. Made of Fiberglas coated with a special rubber compound, the 12 pounds to the pound weight of baggage compartments far exceeds the lower ratings of the bags of the Super Constellation. The bags are made by flexible strength spark-rolling with end to meet all USAF specifications. B & G Controls, which developed the closures and provides the panel liners, reports the tests validated the weight of sliding loads, like the sealing of moving cargo, are feasible for lifting various containers and parcels quickly and may prove to eliminate hydraulic and other equipment on both sides and above the compartments. The pressure-sealing upper linings are overlapped rubber lips that seal tight against pressure from line up to the shear metal strength of the upper shell and in a wide temperature range.

AIRPORT WEEK, September 17, 1954

had been left unbaked when the man had entered the store area, and his last impression was that the left wing of the airplane was down, the remainder nothing further could be determined.

Capt. Volk had been employed continuously by Delta since May 1941. He flew as a captain or first officer from June 1946 until May 1951, when he was assigned as a pilot trainee, 102 T.C. captain. His total flying time with Delta Air Lines was approximately 100 hours, all of which had been on DC-3s. His last instrument check at Atlanta, Deltavia, was satisfactory, at 900 feet, last route check on May 22, 1952.

The company's expression is that, while the captain should have been made aware of the problem,

- 10123 Completion of schedule tasks third phase and in accordance of major importance after safety and reliability considerations
- 10124 It is the opinion of Delta Air Lines to close temporary discontinuation model as practicable
- 10125 It is the opinion of Delta Air Lines to avoid flight disruption included in by executive discretion, to ensure no both F unpredictable to avoid such flight. The effect of



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substance shall be limited by collector of spent."

**ANALYSIS**

Twenty-five minutes before the accident the flight was flying level at 10,000 feet when the wireless at Skipton was next activated after this. Weather was dark, scattered clouds at 1,000 feet, ceiling estimated 4,000 feet; 10000 feet clouds about overcast at 10,000 feet, less fifty 10 miles. Observations light sun downed with clouds. Between 10,000 and 12,000 feet steady, occasional lightning closed in cloud south. The thunderhead was estimated with an known change of altitude from 12,000, and with an approach at least to change course.

About 1400 feet, Skipton, only 21 miles west of the airport, went east and south, the captain evidently elected not to leave the clouds, but to remain VFR which he could have done, but this directly to and in direct seat cost money to Civil Air Registration, as well as to payway charges. The captain had been flying in clouds because he failed at entering the clouds, and only once two miles from his station, or the edge.

The thunderhead in which the crash occurred was very active at the time the flight was made. It changed in shape, and showed no particular order. After the accident, however, it was indicated to have existed, including portions which apparently did not become thunder themselves. This was not known by the captain of the Delta flight and may have believed that the storm did not have a leader. Other sources have further believed that the Air Force had come strength at, he should have known that the storm was local and could be bypassed if it was visible in base, and that pilots had already encountered bases there through the use of the instrument landing ball or the ground area. He was getting into a thunderhead area which looked to the east and had been forced to possibly do step turns, and it had been suggested to him to go around, but he did not take the chance. In view of this, it is felt that such an approach is no longer safe. Capt. Villa did not allow his crew to leave the plane, although an emergency evacuation required him to leave the airplane when possible.

The cause of the condition, whether the crash cannot be determined. However, it is known that the storm appeared to be a very severe one, with area cooling conditions and extremely heavy rain accompanied by wind with strong gusts, surface winds and associated lightning bolts. These factors are indicative of a cumulonimbus or intense cumulus accompanied by violent updrafts and downdrafts. It is known that turbulence, if sufficiently severe, is capable of producing an aircraft uncontrollable. It is also known that the aircraft and fuselage, even in a shock saturated plane, can tolerate that become uncontrollable. At such a configuration disclosed on reading of lightning strike, there may be the possibility that lightning, being impeded by clouds in the cross section, does damage.

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WRITE FOR BULLETIN #109

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Responsible for supervising development of superior aircraft development engineering and systems analysis of avionics navigation, fire control and communications equipment.

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These positions require the ability to manage a comprehensive design, test, developmental engineering organization and to plan broad engineering programs. Your salary should be substantiated by proven supervisory experience and a degree in E.E., M.E., or Physics.

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Mr. John A. Shan, Employment Manager  
Rte. 8-101, Radio Corporation of America  
Camden 2, New Jersey

**RCA**  
RADIO CORPORATION OF AMERICA

ground lighting of strong intensity was seen by us and passed without.

The aircraft attitude, level laterally and at a slight degree with power being de-escalated, indicated it was attempting to eliminate the possibility of a collision.

Considering the possibility that the pilot, after assessing his aircraft flight conditions at his altitude, was descending to establish visual contact, it may be assumed that the pilot had faced with a situation of very low visibility, perhaps described above, but instead of the aircraft and was unable to effect recovery in time to prevent impact with the trees.

The final and well-known fact that the location and type of the aircraft were known to us for some time as exact sources and that scheduled flights would frequently occur in defendant's immediate. But it has long been held in the good practice to shot down aircraft when possible rather than identify or track them down. The reason given when breakdowns are possible and the Lewis Weather Bulbs, previously mentioned, did indeed provide breakdowns set off the defendant's avionics system possibly preventing reaching the destination, thus could easily have been done in the case.

**FINDINGS**

On the basis of all above evidence the Board finds that:

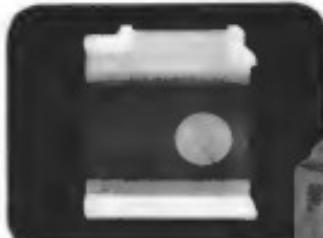
1. The engine, the crew and the aircraft were responsible for the subject flight.
2. The curves had prepared adequate safety instructions against the unnecessary lowering of the fuselage.
3. The captain should have had local rules of the airways.
4. When enroute, due to and approach to the crash site, it was imperative to file a report by company ground personnel that fit well in the need to send the breakdowns.
5. The engine flew directly into the sun without changing course or altitude.
6. The engine while in an inverse position caused the VFR into IFR which without first obtaining an appropriate IFR clearance.
7. A very large localized ground clearance, increased by frequent electric ground lighting, had, lower than, insulation and high winds, was critical to the flight.
8. The flight met extraordinary conditions which the crew and crew failed to the ground.
9. The engine's disengaging, pilot holding and weather discontinuity, was ineffective.

**PROBLEMS CAUSE**

The Board determines that the probable cause of the accident was (1) the disengaging of insulation in a wire, disengagement that resulted in loss of effective control of the aircraft and (2) the failure of the engine to adhere to maximum deceleration requiring the avoidance of breakdowns when one differs would allow such action.

**B. The Civil Aviation Board**

- Mr. Donald Egan*
- Mr. Harvey D. Danan*
- Mr. Jack Lee*
- Mr. Joseph P. Ahern*
- Mr. Chas Gandy*

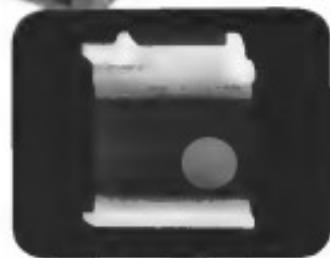


Close-up shows recurring irregularities due to shrinkage.



## RADIOGRAPHY

**puts the finger on  
a profit thief**



A change in gating produced sound castings.

Shrink was a problem in casting this instrument housing of 835 aluminum. It looked like the yield would run low.

But radiographs of pilot runs put the finger on the cause—revealed a pattern of recurring irregularities. This suggested a change in gating which, when adopted, quickly corrected the difficulty.

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X-RAY EQUIPMENT

What's inside this Aircraft Temperature Control?...



## BARBER-COLMAN protects these from shock, vibration, humidity with NOPCO® LOCKFOAM

Barber-Colman Company, Rockford, Ill., is well known for its varied line of aircraft temperature and pressurizing control systems, actuators, air valves, and other avionic equipment. In designing the electronic temperature control shown here, they required a packing material to protect the fragile components and the controlling wiring. It was necessary that the material be both light and strong, have good electrical insulation properties, and be impervious to salt spray and humidity. Operating temperature was not to exceed 250° F., and after curing had to withstand ambient temperatures up to 250° F.

Their search for the right material ended when they tried one of the 50 different formulations of Nopco Lockfoam. "By using Nopco Lockfoam as the packing material," states Barber-Colman, "we were able to meet environmental operating requirements with as economy in manufacturing and assembly time."

These properties of Nopco Lockfoam are finding new applications almost daily—and they are by no means limited to electronics or aviation. Since Nopco Lockfoam is porous foam, it easily fits the configuration you wish to fill. It is consistent and reproducible.

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Jeppesen calls the device "Plane Doctor." It is loaded with charts and sheets in the order they will be needed, and they are easily removed with cautionous assistance as the flight progresses.

Flight deck is made of aluminum alloy, crackle-finished in an aeronautic gray. It weighs 17 oz. and folds flat to height of 16 in. when not in use. Fully open, it measures 9x16x9 in. Price of model and model J3 is \$74.00.

Jeppesen and Co., Stephen's Aircraft, Denver, Colo.



ULTRA-HIGH-PERF. flying room.

### Speedy Camera Rate: 2.4 Million per Second

To serve the needs of research workers, Beckman & Whitley, Inc., has developed an ultra-high-speed framing camera—2.4 Million per second—and resolution photographs are taken at speeds as high as 2.5 million per second. A similar fast frame speed model—the 100—covers the range up to 1.2 million frames per second.

The camera is intended for use in combustion, conduction, evaporation, plastic and dielectric deformation, and shock wave phenomena investigations.

An image of the subject matter is focused on the image plane through a highly corrected 25-mm. achromatic lens. The image is enlarged, 1 in. 2, to the glass plate via a 3-in. relay through 25 pieces of adjustable achromats. Planocorrect, field flattener lenses are located at each focus position within 0.002 in. of the film emulsion. A total of 25 frames per sec can be exposed on stationary, projecting 35 mm. film.

In operation the camera's objective lens can be oriented in a vertical or horizontal plane. In the Model 212, a



and **NEVER BEFORE** has the  
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In the never-ending conquest of the vast barriers of space and time, Douglas goes ever forward meeting every challenge that man and machine must face. The newest—and brightest—star in the aviation firmament, the Douglas DC-7, is truly a monument of the mastery of man over machines . . . and in this great work nation A. W. Haydon testing devices play an important part.

We at A. W. Haydon take pride in our contribution toward helping a mass of metal and machinery into unrivaled performance which makes Douglas' high standards. Unrivaled performance is born of a multitude of small component parts, working in perfect mechanical and electrical coordination. The A. W. Haydon precision testing instruments are a vital part of this vast network.



DOUGLAS DC-7, the ultimate in comfortable and safe air travel. Swift, luxurious, dependable—the new DOUGLAS DC-7 justly deserves the accolades it is receiving.

✓ A. W. Haydon Time Delay Relay is a very important component of the automatic feathering system.

✓ A. W. Haydon Time Delay Relay, time derivative of prop. feathering.

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✓ A. W. Haydon D.C. Timing blenders are used in the cabin pressurization system.



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Westinghouse Air Brake Company's Decelostat Controller equipment features safety with other hydraulic or air brakes. Company equipment weighs just 12.2 lbs.

## No Skids ON CONVAIR 340'S WITH WESTINGHOUSE DECESLOSTAT® CONTROLLERS

To prevent the skidding during landings and to increase safety on short runways, Phillips Airlines, Inc., is equipping certain first of Conair 340 aircraft with Westinghouse Decelostat Controllers.

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## WHAT'S NEW

### Telling the Market

Logistics data and points for business decisions are included in a new market study by Alan Dornon of H. M. Dornon Co., Marine Division, 311 Listed are more than 500 standard items and types of business both with rows together with price lists.

The publication also contains tables of approximate weights, mechanical properties and other pertinent data relevant to aircraft and engine builders the company reports. A copy may be obtained from Harper without charge.

Helicopters, planes and equipment used with it is described in Catalog ADC 7000. West Air Reference Sales Co., 60 E. 42 St., N.Y. 37, N.Y. Users and potential users of materials and instruments often in one form are invited to send for Bulletin A-11 which discusses typical compositions, regularity practices and their applications, materials and suitable types of sensors. West International Nickel Co., Inc., 67 Wall St., New York 5, N.Y.

Sel-Gard metallic rod supports, designed to keep dust from hydraulic pipe rigs by sealing off damage entries are described in bulletin 1000, available from Sel-Gard Corp., 2010 3rd Street, San Bruno, Calif. Via Delo (Deltor), Mich. Balance-Find Dimension of Position, or a breaking decreasing relationship between vibration phenomena and performance measurements and use of output equipment in detecting and eliminating unwanted vibration in working parts. West Gakkens Industrial Mfg. Co., Inc., 500 W. 56 College St., Yellow Springs, Ohio.

### Publications Received

• Douglas Aircraft Co., Inc., and the Aero-raft Manufacturing Industry, Radio, Lock & Co., 101 W. 42 St., New York 18, 19 pp. This technical report contains study findings Douglas plane, present and future roles in support of U.S. satellite industry.

• The Helicopter and How It Flies, by John Dray, with drawings by Jerry Reinwald, 70 pp. The Prentice-Hall, Inc., 155 Madison Ave., New York, N.Y. 10016, 100 pp. Fundamental aspects of rotary wing flight explained without resort to mathematical formulae.

• New Horizons, compiled by Pan American World Airways, Inc., 60 Wall St., New York 10, N.Y. 10005, 272 pp. Perfect guide containing travel tips and information about all its continents.

• Elementary Test Design, by Elmer R. Brown, Jr., by Elmer R. Brown, Jr., Co., Inc., 271 N. Wabash, Ste. 11, Chicago, Ill. 60670, 224 pp. Ideas for creating test design and test for the skilled reader in test engineer or making "man proof" tests.

## When you measure PERFORMANCE

### LOOK AT THE FACTS

Riding with each of four powerful engines that place the Super Constellation in the top-speed transport class, are two-Kit Associates' M-4710 boost actuators that help keep those mighty engines cool. Power-packed "lightweight," these dependable actuators open or close the big Convair's nose flaps in 15 seconds. Despite normally high temperature and vibration conditions adjacent to the engines, the M-4710's have proved their ruggedness over many thousands of operational hours. Under emergency conditions, one actuator can operate the entire system... typical of Kit Associates' built-in safety factors.

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#### VOLUME: 24.8 C.

FRONT END: 2,240 POUNDS MAX

COMPRESSION: 1643, 1,000 POUNDS MAX.

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## The plane that prevented a war and TEMCO'S part in building it!

Convair's B-57's and the men of SAC were about all that stood between this country and its enemies in the late 1940's and early 1950's. Many feel that this team prevented a third World War. Today, as then, they are powerful deterrents to any would-be aggressor. Production of those giant planes required thousands of man hours and involved many problems. Convair helped amplify production by sub-contracting elevator, rudder, and door assemblies to TEMCO.



**Convair B-57 elevator doors** TEMCO workers at a wheelbarrow into wet spray booth for its last coat of paint before being shipped to Convair, Ft. Worth, for final assembly.



This is but one of many jobs wherein TEMCO has helped expand the Nation's defense effort. And it is one of the many jobs that has earned TEMCO the reputation for delivering a quality product, on schedule, at one of the lowest costs in the industry.

## AIR TRANSPORT



### TCA Tells Why It Chose Vickers Viscount

- Canadian airline says faster, quieter turboprop has more public appeal than its competitor, Convair 340.
- Officials also outline major changes being made in the transport for below-the-acro operation in North America.

**MONTREAL**—Trans-Canada Air Lines says it picked the Vickers Viscount because it is faster and quieter than its major competitor, the Convair 340, and because its turboprop engine is at the start of its career while the 340's piston powerplant, in TCA's opinion, has reached maximum development.

Airline officials believe the British turboprop's speed edge (315 mph. max) will put the Viscount more miles ahead than the U.S. jetliner (304 mph.) and that it will be a substantial advance in air transport equipment. Passengers also prefer a fast-engine aircraft to one with only two piston engines, they say.

In addition, TCA expects the Viscount to be less expensive to operate than the Convair after initial start-up costs.

►**22-Turboprops.** Fleet—Trans-Canada increased its total Viscount order from 15 to 22 two weeks ago and announced that the first is scheduled to start flying the Montreal-Toronto-Winnipeg route Feb. 1 (Aviation Week Sept. 6, p. 24).

Twelve of 22 of the British 700 turboprops are expected to be in operation

on routes in Eastern Canada and the U.S. by April.

By May 1, TCA also will commence North Star service seven daily between Toronto and New York and Toronto-Chicago. On Sept. 26, it will start daily Super Constellation flights between Toronto-Winnipeg-Vancouver.

►**250 Classages.**—When Trans-Canada takes delivery of the first Viscount later this month, it will add another 250-seat transport to its fleet since 270-passenger classages had been added to the airline by the addition of Viscounts.

These were made to fit the requirements in with existing methods in North America, because of public acceptance on the continent of passenger comfort and ease of seating and maintenance, says TCA chief engineer John T. Dewart.

These were a new design to ratings of Shanghai's mandarin in the language for seat designating.

►**Improved Safety.**—The gross weight of the Viscount is 30,000 lb., compared to 29 to 30 tons, the landing weight from 25 to 27 tons, and the run fuel weight from 47,000 to 49,000 lb. Increased strength of the airframe has been made possible by having the Rolls-Royce

Rolls engine transceiver, shrouded with no additional postplane weight, is carried in the engine, and at no sacrifice of fuel economy.

With automatic equipment was installed to reduce the load on the pilot, to increase safety and reduce the losses element in operation, Dewart told Aviation Week at TCA headquarters here. The entire cockpit, for example, was redesigned to allow either pilot to operate the Viscount alone in case of necessity.

Standard American instruments are being used, excepting those associated with the engine. British engine instruments designed for the Dart are being used, as are British automatic instruments designed for the Viscount. Other minor instrumentation fitted in the plane include a standard U.S. drags smiley in that said in other Trans-Canada aircraft.

Sidling windows on the Viscount cockpit have been redesigned to improve visibility and to permit a crew member to get his head out the window. Nose glass has been developed for the Viscount to act as the main operating surface for the windshield. Alcohol is being maintained in an ammonia solution to prevent freezing.

A short windshiel wiper has been installed to assist the center windshield panel. Automatic parking and stopped used control has been incorporated in the windshield wiper system.

Vickers in Canada for two months early in 1983 to find out what changes would be necessary.

During other stages, some long-term studies were carried out with the British to permit it to formulate a proposal for an automatic control for hot start for the propellers and engine cooling system that adapts its rate to outside temperature.

To facilitate low temperatures, starting Rolls-Royce designed the use of a synthetic low viscosity lubricating oil, and redesigned the lower antivibration bearing. TCA was the first to order high-energy options. With these changes it will be possible to start the aircraft in -30 deg below zero temperature after standing for 12 hours in that temperature.

It also believed that some means of automatically controlling these temperatures should be installed. Critical temperatures for metals are now 1,638 F and operating temperatures between 1,380 and 1,550.

Finally, small fuel tank was not enough to guarantee that engine fire protection was not exceeded, so air temperatures above standard. The automatic control of heat temperature reduces the flow of the pilot burner when temperatures drop.

British Royal Air Force wings were designed with a refueling landing cage to permit installation of both doors bows with stainless steel access shells. A Royal Air Force reworking system is being installed that overdrives an gear pump as well as pump.

► **Independent Supply**—TCA and Vickers change had the system so that each turboprop has an independent supply at the same time providing alternative emergency fuel and crew oxygen.

In order to meet the possibility of air craft financing in the fuel ratio, an automatically controlled gas-fired heating system was developed.

The Dart engines will use wide cut gearboxes. For a 4/F, both the transmission and shaft motors. It will be at least 10% cheaper than current TCA designed gearboxes because of the unknown factors, such as static deflection, effect of lightness and safety point. TCA claims it will be the first aircraft to use the 4/F unit, although no evidence has been disclosed on it for their turbines.

A pre-select type of pressure filling has been installed for the water/heat and system. This, along with the standard pressure refilling system, eliminates climbing on top of the wing at a station stop. The opposite type fuel and water/heat/glycol mixing was replaced by the balanced bridge Positive type.

► **Two Pilots**—TCA chose two more seats with the Vickers:

► Use of dual-type NACA air inlet, a

## TCA Future Plans

TCA-Cessna Air France future planning calls for one or 20-passenger turboprop by 1987 and 100-passenger from Atlantic Constructors' joint venture by 1990. Atlantic Work has begun.

Cessna, Inc., Montreal, now is starting to build a Canadian version of the *Business Jet* Canadian Air Force. First military series should be flying in about two years, with commercial models to follow, TCA officials estimate.

Change made because the external aircoop on the belly of the Viscount complicated a considerable amount of noise and vibration in the cabin.

► It also has installed a completely integrated passive water system using superheated water with tubes 1/8 in. in diameter.

Cargo compartment girts have been installed and walls have been planed at the doors to keep the baggage bins falling out when the doors are open.

► **Initial** cabin heating equipment with automatic controls has been installed to permit heating the airplane on the ground and to augment the standard choke system in flight. The bleed from the cabin superheaters has been made automatic.

► **Suspension Changes**—The main suspension has been modified to make it more reliable in respect of the structure.

Wing trailing edge shock absorber has been strengthened to increase the life.

The reduced wing flap size has been increased to thickness to withstand the repeat of dash and crosses up by the main gear.

The tail fins have been removed between the elevator and the horizontal stabilizer to permit a reduction of the aircraft's weight. Extensive fairings for fuel and operating mechanisms changes have been made in an effort to overcome previous difficulties. The flap motor and control lever have been changed to permit wider flexibility in flap operation.

All access panels on the exterior of the airplane will incorporate Harwell fasteners. In the cabin interior and washrooms, no stainless steel sheet because of reported shortcomings and through-life costs.

► **Wing Loading**—This has been minimized to make the wing profile much smoother on the ground. The Drakkar Moment anti-torsion breaking coated has been modified to prevent extremes loading efficiency and corrode fast and limit life as short as six years.

► **Engaged Facilities**—Maintenance and servicing of the Vickers and Dart engines will be done primarily at Washington Cessna maintenance shop. To this end, both Canadian and European techniques have been taken on and the facilities expanded. A test house to test the Dart engine is being built. The office will overlook its Dart en-

gine every 750 hours and use its signature programme maintenance scheme to service the aircraft.

Seat tracks were modified to prevent double tracking. The aircraft will be fitted with GCI with fine lining for 12G. The cabin and cargo door latches and hold-open mechanisms have been redesigned to give a higher degree of safety and protection. New latches made for inspecting the hatch mechanism when the doors are closed.

► **Quiet Viscount**—Additional soundproofing material has been installed and TCA techniques incorporated. It is expected that the TCA Viscount will be quiet enough so that passengers won't notice it is flying.

Cargo compartment girts have been installed and walls have been planed at the doors to keep the baggage bins falling out when the doors are open.

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gine every 750 hours and use its signature programme maintenance scheme to service the aircraft.

TCA has sold 100 aircraft to date to the Viscount will receive less maintenance than others because of less vibration in flight. It has an expectation on British European Airways to purchase with all British own-

parts manufacturers to establish service and spare part depots in Canada.

Viscount will receive less maintenance than others because of less vibration in flight. It has an expectation on British European Airways to purchase with all British own-

parts manufacturers to establish service and spare part depots in Canada.

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## How Capital Financed 40 Viscounts

Attribute arranged terms on \$45-million total directly with Vickers, had no "give away" break for Britain.

Capital Airlines is using a conventional financing approach to purchase an initial set of 40 turboprop Viscounts from Vickers-Armstrongs, Ltd. (AVIATION Week, Aug. 23, p. 93).

Management agency and contractor chartering this route believe this has led to initial minimum revenues that the British government was financing this equipment directly on a virtual "gray area" basis in order to attract capital at a customer and then break even in the U.S. market.

The fact indicates that the financing arrangement was intended to Capital's desire to purchase the Viscounts. Moreover, the aircraft operations are being financed directly with the British government and not with the British government.

► **Private Study**—Preliminary as the operational and economic characteristics of the Viscount, reported as reviewed thoroughly by the airlines from the first segment through 10 years of working conditions, Capital determined that this plane could be used effectively in the international air passenger sector in route structure and at the same time competitive, as well as profitable.

British European Airways has adopted similar systems with the plane since early 1975.

Centrally, a conclusive U.S. "long term financing" by disapproving the wisdom of CAP's selection will not be known until after the planes have been delivered to service by the carrier in the spring of 1975.

► **Single, Direct**—For the total of 48 Viscounts and spare parts, Capital is obliged to pay approximately \$45 million. (The option on 20 additional planes, if exercised, will entail new Capital commitments.)

As far as the airline is concerned, its financial arrangements are direct and simple. Upon delivery of each plane (less spares), Capital agrees to make payment over a period of five years in 60 equal monthly installments starting from the date of delivery of each unit. All contractual liabilities will be in effect at a rate of 12% per annum above the prevailing Bank of England

re-lending rate at date of payment. Should the present rate of interest rate remain at 12%, the total would indicate a total interest cost of 48% per annum in the carrier.

Capital's date of this transaction will increase slowly to match the Viscount delivery, starting in March 1975 and scheduled for completion in August 1976. By the end of 1976, the total number will be 40, unless the date of the first plane starting in August 1975.

► **Fleet Sales**—These dates will be accompanied by charted stripages in the Viscounts. At that time equipment is introduced to service, it is likely that Capital's DC-9s and DC-4s, and possibly later the Concorde, will be retired. Not proceeds as realized after repayment of CAP's portion bank loan, will be paid to reduce the indebtedness to the British government and another portion of the aircraft.

As of July 31, 1974, Capital's bank loans amounted \$5 million with reserve assets stabilized at 35 quarterly overall.

## Viscount Cost

Capital Airlines will pay an average cost rate of \$160,000 per seat of an 40 turboprop Viscounts. Vickers, management agency, return currency equivalent to import duties.

In a report to shareholders, CAP president J. H. Cowick said the airline's agreement with Vickers-Armstrongs includes the right to negotiate for options for the acquisition of aircraft from the manufacturer during the next three years. The options may be exercised through private company routes to that they may fulfill their commitment to Capital.

Obviously, any large-scale transaction of this nature and dealing with the export market would require approval of various British government agencies. The credit and insurance supplies available in the British market are limited and would appear to place a restriction on any widespread utilization of the same financing scheme by Vickers and Rolls-Royce to other airline purchases.

—Sieg Alschel

## PHOTOGRAPHIC EQUIPMENT

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**Instrumentation Camera**  
This camera offers 100% off-the-shelf diagnostic and repair service. It can make a wide range of measurements, including capacitance and resistance, temperature, humidity, pressure, flow, torque, vibration, current and voltage. It can also measure and record up to 1000 data points during 1000 seconds.



These are just two examples of instruments designed, engineered and produced by PSC Applied Research Limited for use in general industry, and the electronics and aviation fields.

For further information write:

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WHAT'S THE CONNECTION?



The IAL Short Range Radio Teletype will provide communication between aircraft and land-based stations. These landlines are not reliable or difficult to maintain, such as through people, over desert or across the sea.



A typical use for these low cost terminals is in areas in support to air幕 or areas of poor landing communication. The IAL Short Range Radio Teletype will work on VHF and microwave for operation over ranges up to 25 miles.

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TEL: HYD 5024

IATA 10th General Meeting Opens

## Profits Dwindling, Hildred Warns

Director General says heavy taxes and high operating expenses are narrowing the cost-revenue margin.

By Frank Shear, Jr.

In 1952 and, on the basis of preliminary 1953 statistics, in late July 1-3, IATA President Anne here on a member note, IATA director general Sir William F. Hildred warned that the world's airlines are experiencing an "economic shock wave" and that despite increasing business their financial situation is deteriorating fast.

In his annual report, Sir William told the assembled airline presidents and delegates from more than 40 countries that "we lose each night the 100 million passengers who fly over the cost of operation and the demands of the tax collector."

► **Critical Period**—The change between airline costs and revenues, he said, "has steadily narrowed down until it is, in many cases, nonexistent. One can despair as to whether technical or otherwise, as the next future which can be expected to change this balance."

The airline's main hope of getting through this critical economic period, according to Sir William, lies in two directions:

► **Further reduction internal** streamlining of airline's commercial and administrative systems;

► **Some sales thought** and analysis, and a little self-renewal by government, particularly in taxation.

The airlines are collectively paying almost \$3 cents of every dollar they collect in governments in taxes and charges, and are left with only one cent with which to pay interest on airline securities, satisfy their shareholders and keep up reserves, Sir William pointed out.

Moreover, he said, present and proposed new passenger taxes and landing fees are "a problem for the travel industry and a threat to the short-haul airfares." He added that this is particularly true in Europe.

► **Address to Government**—In a statement directed to the governments, Sir William recommended that the government agree to reduce subsidy by changing laws, to encourage investment by reducing revenues and to get experience by dividing up stakes. In short, governments cannot expect to have their cake and eat it too."

In his appraisal of the economic status of the industry, IATA's director general and the editor of the airline's operating resources cost operating costs has dwindled from 6% in 1951 to 3.6%

cent. And they need to be allowed to accumulate sufficient reserve to finance their plans once there are made.

"Given all of this," for William said, "they can still seek government assistance, but they will need a good deal less in the form than they would at stake in what they have brought in terms of patients in an hospital."

► **Traffic Grows**—Sir William estimated that IATA member airlines were now carrying 60% of world scheduled traffic both domestic and international, outside China and Russia.

He pointed out that traffic itself increased in all categories during the past year over 1952 records, but added that while passenger traffic was up 16%, cargo traffic was up only 4%. The increased dependence in the air is the 7.5% increase in tonnage, "considering the reduction in the rate price the drivers by world transportation."

► **Stagnant**—The importance of development of the air cargo market, Sir William said. "The lines are slow. Passengers have been few been reduced to the point where the carrier's margin is extremely small. Our compensation for carrying mail has been cut without a corresponding increase in volume from lower postage rates to the public. Our remaining hope for expansion lies, like previously in the cargo field."

He added that "at the moment we are making progress for cargo expansion on a worldwide basis," but said "the cargo rate structure needs careful examination, and I hope myself that we can find ways to reduce its level substantially."

"We cannot expect much improvement by going strong as we have." We have reached the point where the postage, as well as the economy of the industry is at stake. And if we can't succeed, we can't count on the industry that we have had to depend on in the passenger field and the cargo field."

► **Aircraft Growth**—On expanded aircraft services, Sir William reported that growth is both the extent and popularity of this type service during the past year has been "both marked and gratifying."

Scaling a note of caution, he said: "Nevertheless, the expansion indicates that in some cases, expansion of services and traffic that is occurring has been too rapid for the industry to meet. We must take into account that certain first-class passenger services have been reduced with tourist gate entries."

► **Stabilized Airlines**—In order to keep their strength in fully adaptable as possible "because we are still in a period where the classifications and differences between first-class and tourist are not completely crystallized."

► **Copied Interest**—Rising—Citing the intense interest in helicopter development in virtually every country, and operations spreading rapidly, Sir William and the



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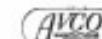
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COCKPIT  
VIEWPOINT

By Capt. R. C. Balmer



## Study of Instrument Approaches

Each year sees the publication of some interesting work on the all-important subject, the instrument approaches—important because it bears so directly on that extra safety factor in transportation now held during bad weather.

I am just getting around to a paper entitled "A Quantitative Study of Instrument Approaches" by J. F. W. Mason presented last October before the Royal Aeronautical Society. It is recommended highly for those interested in the subject.

**Fido Approaches.** There will be no argument with Mason that the transition from visual to visual flight, probably the most important of all pilot-training in the approach and landing maneuver. Discussion following the paper seemed to indicate that Fido would be the answer to this, and that a meeting on which this will be agreed.

Let me quote the words of an experienced instrument pilot who has had numerous "Fidos":

"Under about one wind condition, either this light, Fido appears to be very ineffective. The moment Fido fails to come down, visibility becomes far worse than before Fido was turned on. It creates a half-kilometer distance between me and the fog. It uses 450 gallons of 60-second gasoline per minute."

"It comes in violent resolution at the latter part of the final approach and over the runway. It is extremely difficult to keep up Fido approach and make a smooth landing until the plane passes the point which has been chosen."

"It is similar to the living journals a rabbit while laying eggs. When the plane penetrates the shell of the egg, you have trouble continuing. The runway is clear. If the approach is correct, a landing can be accomplished. The pilot, however, is not aware of alignment until the eggshell is penetrated."

**Newark Systems.** I feel certain that if the advocates of Fido could see the Newark approach light system, especially the constant discharge units, in operation during low visibility, they might change their belief. The one place where Newark fails down is on the runway where 120 ft. spacing of lights is insufficient. The availability of variable Fido color has light, past present markings, should complete this system to ensure all but the worst conditions for instrument flying.

Concern was expressed at Newark over the speed of "over the fence" speed of instrument approaches. To my mind, this is debatable. Nine pilots would prefer the increased stability generally associated with higher wing-loading to the constant "bunting" sometimes found at the slower, less dragful speeds.

Unless the pilot can control his decimal stability with sufficient precision, he chance of success in carrying out various weather landings are poor.

**Stability of heading.** Above leads to the potentialities of attitude control devices, and Mason presented various aids of the engine in his paper. But it remained for a pilot, Capt. Peter Bowes of British Patagonian Airways, to explain more of the operational considerations in the discussion period after the paper. His remarks are classic, and next time we'll be columns will report on them.

## AVIATION CALENDAR

Sept. 19-21—International Northwest Air Show and Council, Hotel Stevens, Vancouver, Wash.

Sept. 20-22—Annual Meeting of the American Helicopter Association, annual meeting and exhibition, Bellanca Manufacturing Corp., Philadelphia.

Sept. 21-24—American Astronaut Society, fall meeting, Hilton Hotel, El Paso, Tex.

Sept. 22-24—National Space Congress, at Washington, D. C.

Sept. 23-25—Pioneers, dinner meeting, Lexington Hotel, New York City.

Oct. 4-6—Tenth annual National Petroleum Conference, Hotel Sherman, Chicago.

Oct. 9-11—Champion Spark Plug Co. 10th Annual Award Banquet and Symposium, Cleveland, Ohio.

Oct. 9-12—Society of Automotive Engineers National Aeromechanics Meeting, Aircraft Production Forum and Aircraft Designers' Council, Hotel Statler, Los Angeles.

Oct. 10-12—Mechanics' Show, New York, with portions an intensive part, 25th Annual Meeting.

Oct. 13-14—Aerospace Asia, of Aero-Expo 1954 conference on airport management and operations, University of Minnesota, Minneapolis, Minn.

Oct. 14-15—Annual meeting of the Aerospace Science and Control Association in Atlanta, Georgia, Atlanta.

Oct. 17-20—International Union of Aviation Sciences annual meeting, Hotel Statler, Los Angeles.

Oct. 18-19—Mechanics' Show, New York, with portions an intensive part, 25th Annual Meeting.

Oct. 21-24—Aerospace Asia, of Aero-Expo 1954 conference on airport management and operations, University of Minnesota, Minneapolis, Minn.

Oct. 24-25—Annual meeting of the Aerospace Science and Control Association in Atlanta, Georgia, Atlanta.

Oct. 27-29—International Union of Aviation Sciences annual meeting, Hotel Statler, Los Angeles.

Oct. 28-29—Mechanics' Show, New York, with portions an intensive part, 25th Annual Meeting.

Oct. 30-Nov. 1—National Institute of Locomotive Engineers, Education conference, Lord Baden-Hill, Birmingham.

Oct. 30-31—National Safety Council, Annual Meeting, Conrad Hilton Hotel, Chicago.

Oct. 30-Nov. 1—Annual Meeting, Rock State Airport Development and Operation Conference, Saratoga, N. Y.

Oct. 31-Nov. 1—American Society for Quality Control, eighth New England conference, Hotel Plaza, Stamford, Conn.

Oct. 31-Nov. 1—Mechanics' Show, New York, with portions an intensive part, 25th Annual Meeting.

Nov. 1-2—Aero-Expo 1954 conference, New York, with portions an intensive part, 25th Annual Meeting.

Nov. 1-2—Aero-Expo 1954 conference, Newark, N. J.

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# THE NEW U.S. AIR FORCE

Following is the third installment of extracts from a report to Congress made by Lt. Gen. White, then Assistant Secretary of the Air Force, outlining management and operational aspects of the Administrator's current drive for more efficient use of USAF resources—manpower, money, facilities and materiel.

—RHW

## Management & Operation III

### MANAGEMENT CONTROL SYSTEM

Implementation of the work measurement system revealed the accurate but conspicuously integrated management control system in the command and control activities. As a result, it is now planned to extend the project to include the categories of production control, standard cost accounting and payroll distribution systems with work measurement. The ultimate objective, of course, is to have these systems integrated and placed in effect at all of our remaining seven Air Materiel Areas and the Air Force depots.

### REDUCTIONS IN TRAVEL

6. We have taken the following steps during fiscal 1954 to reduce travel:

(a) With the reduction of combat crew requirements for Korea, some crews were in the passes. In managing these people, we had, until consideration of the location of the aircraft, no real incentive to encourage them to remain near their locations. This eliminated dependents travel in some instances and reduced it in others.

(b) As of Aug. 1, 1953, we began filling certain requirements for some three-level staff direct from the technical schools instead of leaving on the commands.

(c) We lengthened dependent leave in the Far East, thus reducing substance travel of dependents.

(d) We established a policy to separate off-duty graduates of professional schools for overseas vulnerability and make such assignments direct from school, thus eliminating one travel move per individual. Statistically, we studied the distributions of overseas officers returning to the United States to determine their eligibility for school and made the necessary arrangements in this area so that in the United States rather than delaying them to go to a Zone of Interest station before going to school, thus shortening one move.

(e) As of Oct. 1, 1953, we established the rule that officers must have at least 18 months' Zone of Interest residency between overseas tours unless the service requires otherwise due to present the exception of the 18 months and at the same time it made available by law concerned, in which case 12 months' residency in the Zone of Interest is required.

(f) We required that officers and airmen have at least 10 months' residency before being assigned overseas instead of the 12 months formerly required, thus achieving a longer overseas tour.

(g) We directed that ROPC officers assigned to their first Zone of Interest station not be reassigned overseas unless they volunteer to stay in the Air Force longer than 18 years.

(h) We authorized the extension of overseas tour to a maximum of 48 months as a voluntary basis.

### CIVILIAN CLASSIFICATION SURVEY

10. In the latter part of 1951 a task study was started to determine whether there was any duplication in civilian-military personnel staffing and whether there was any unnecessary

use of grade structure. As a result of this study it was found that in the place selected for the original study 375 civilian supervisor spaces could be measured and 14 positions in the civilian personnel office could be abolished.

As a result of the task study, three new areas have been added to civilian personnel classification survey of all active grades throughout the United States. Civilian positions and responsibilities will be reviewed to establish the proper grading in the high levels, improve organizational structure, and eliminate bypassing of supervisory positions.

### Savings Increase Combat Forces

"During fiscal 1954 (ending June 30, 1954), the Air Force increased forces in being by achieving early combat readiness, early integration of combat and support organizations, and a range of simultaneous flying support assets. In addition, there was an expansion of the North American air defense net, no increase in NATO targets, the establishment of 20 additional mounting bases and the continuation of combat-ready status of bases in Korea.

"Civilian personnel authorizations, including those engaged in the Mutual Defense Assistance Program, decreased from 397,007 on June 30, 1953, to 344,342 on June 30, 1954. Military personnel authorizations during this period decreased from 983,637 to 955,194 in spite of increases in forces in being and generated worldwide. The Air Force was able to accomplish these very largely by achieving the added combat and changing the weather training into combat forces. Reductions in status, cost and other charges required to meet the additional combat units activated have caused to partially offset large deficits now forecasted for fiscal years 1955 and 1957.

"The Air Force sponsored a review of installations by major commands. This program was productive, resulting in effective reductions of 10,745 space authorizations. Approximately 19,900 authorizations reductions were realized by workload adjustments affecting six major AF commands."—from the Quarterly Progress Report on Manpower and Personnel Control, USAF.

At a study of the actions taken by the Air Force in October 1953, the military strength was reduced from a high of approximately 850,000 as of June 30, 1953, to approximately 907,000 as of Sept. 30, 1954. The civilian strength was reduced from a high of approximately 310,000 on Feb. 1, 1953 to approximately 239,000 on Dec. 31, 1953. Now we have shaken down to a firm base we are building up toward the 973,000 military forces for the end of fiscal 1954 and we have opened our training programs so that the new people we are taking in AFD will be trained in the skills where the greatest need of the service lies or where the greatest demand for the end of fiscal 1953 and fiscal 1954 usage requirements are found now.

As a matter of information, the military strength of the Air Force has grown back as of Aug. 1, 1954, to approximately 937,000 and the civilian strength to approximately 282,000.

These were actions and others which I bring you covered by results in reduced manpower costs which have been taken into account in the budget presented to you.

For your further information, we are continuing daily our civilian manpower policies and processes with the idea of reducing officer, airmen, and civilians whenever possible.

(To be continued)

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